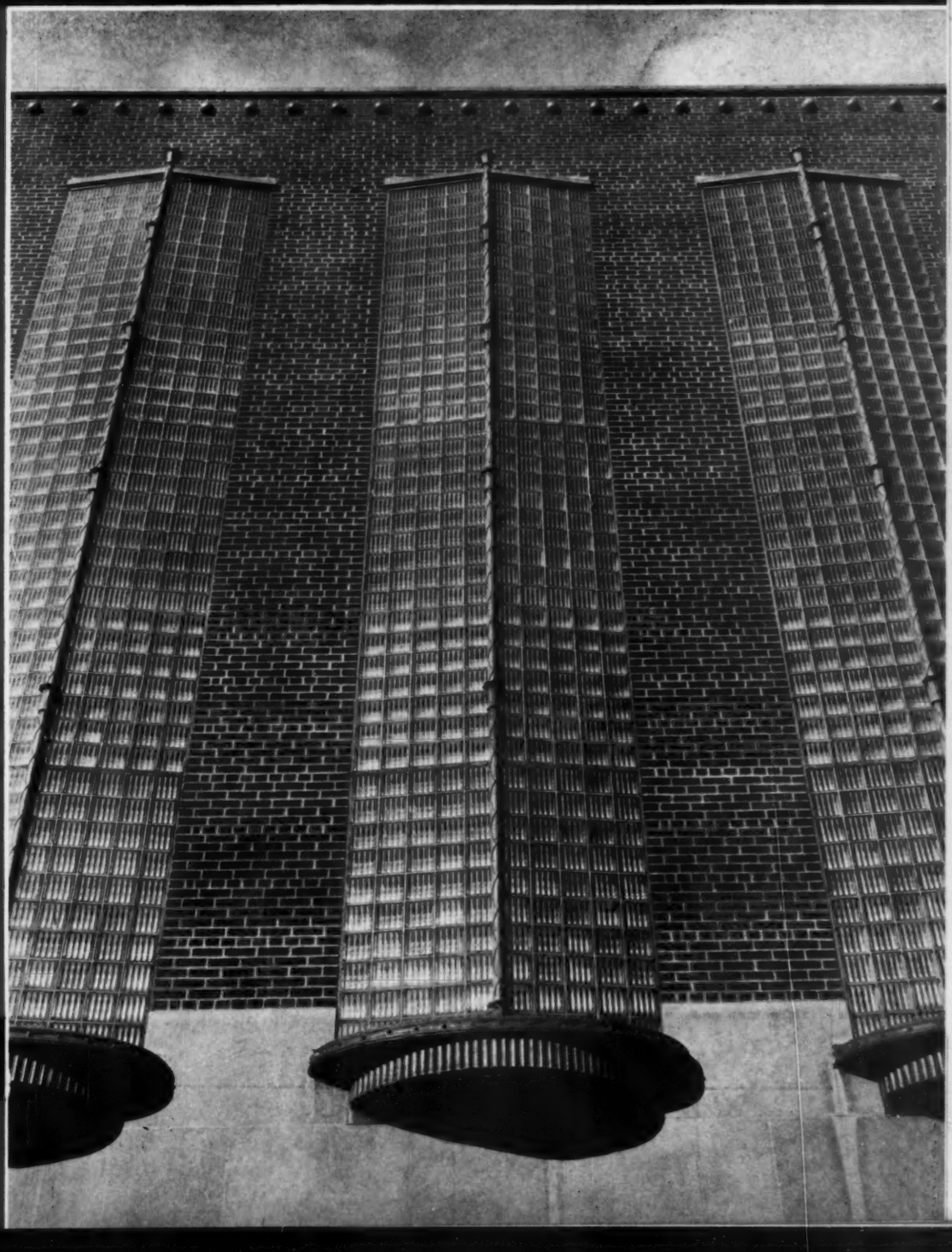
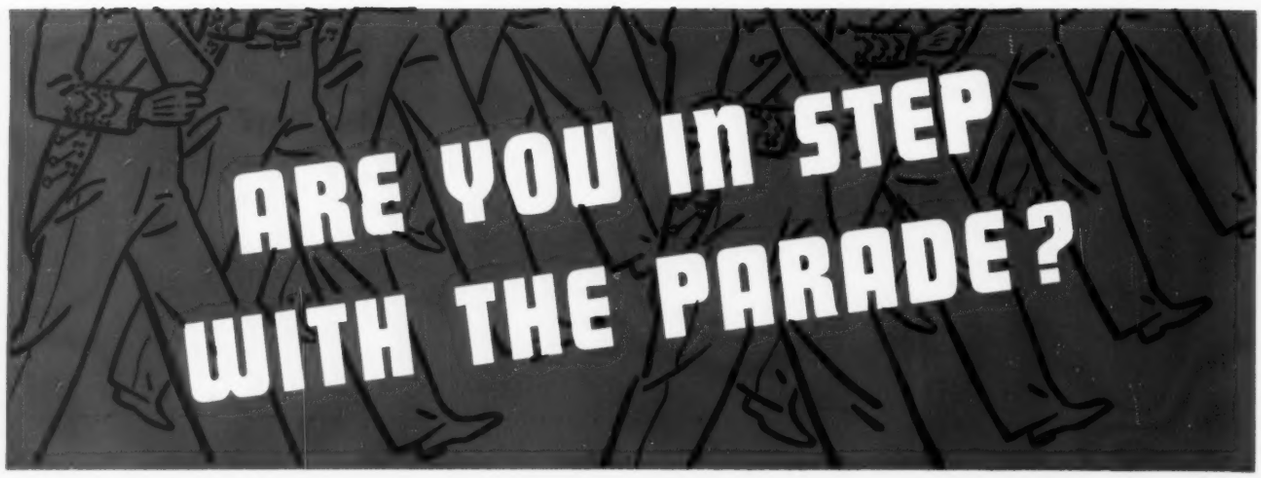
AMERICAN ARTISAN

WARM AIR HEATING • AIR CONDITIONING
SHEET METAL CONTRACTING

AIR CONDITIONING SECTION
PAGE 43



ESTABLISHED 1880
FEBRUARY 1938

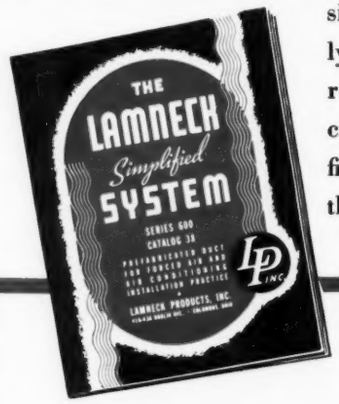


THE development of air conditioning is moving ahead so fast there's no time to wait for laggards. If you want to keep up with the parade toward better business and bigger profits you've got to be headed right and in step with the most advance methods.

Manufacturers today insist on installation practice that matches the advanced engineering standards of their units. Customers demand installations that are attractively styled, thoroughly up-to-date and that will insure the highest efficiency of the equipment. The use of hand-fabricated duct is too cumbersome, old-fashioned and inefficient to meet these present day requirements.

Lamneck Prefabricated Duct, Series 600, supplies the answer to the dealer who wants to make the most of his merchandising opportunity. It takes him away from the bench of hard work and meager pay out into the office of bigger business and substantial profits.

The use of Lamneck Prefabricated Duct is sound merchandising because the wide experience of Lamneck engineers insures a product that meets perfectly the dealer's problems of economy, efficiency, and dependability. It substantially reduces installation costs because it is surprisingly simple, amazingly flexible, and remarkably accurate in fit. It fills the bill and the dealer's till.



THE NEW 1938 LAMNECK CATALOG IS READY

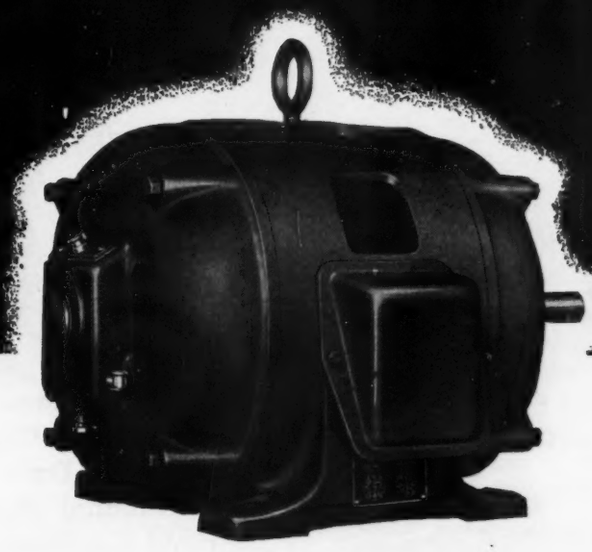
The new Lamneck Catalog for 1938 is off the press. It shows photographs of all items in the complete Lamneck Simplified System, Series 600—together with descriptions, sizes and prices. Rearranged and simplified for compactness and convenience. Write for your copy if you have not already received it. Extra copies if you need them. No charge.

A valuable feature of LAMNECK SERVICE is the wide availability of jobbers' stocks in all parts of the country. If you don't know the Lamneck jobber in your territory, write us and we will put you in touch with him immediately. If there has been no Lamneck jobber yet appointed in your territory we will be pleased to handle your orders temporarily direct from factory.

LAMNECK PRODUCTS, INC.
414 DUBLIN AVENUE • COLUMBUS, OHIO

PREFABRICATED DUCT AND FITTINGS FOR FORCED AIR AND AIR CONDITIONING SYSTEMS

Smooth Acceleration...
FROM NO LOAD TO FULL LOAD



... *Important for* BLOWERS

Here's a motor that definitely meets the specific load requirements of Blower Applications, because it is designed to produce torque—or turning effort—at the rate necessary to assure smooth acceleration of the load.

This is most important because during the period of acceleration from zero speed to full speed, the blower imposes a load on the motor that increases as the cube of the speed. Furthermore, since the blower speed increases gradually the load on the motor is increased gradually.

Century Motors are particularly adapted to this service because they are designed to meet these smooth, mounting blower load demands with an equally smooth torque output that maintains the dynamic balance of the blower and therefore assures its continuous, effective output.

Test a Century Motor fc quiet balance and its ability to smoothly bring a blower load up to speed.

Write our general office for further particulars, or call one of our branch offices —conveniently located in principal cities.

CENTURY ELECTRIC COMPANY
1806 Pine Street • • St. Louis, Mo.
Offices and Stock Points in Principal Cities

Century MOTORS

In This Issue

IN this issue appears condensed reports of three conventions. As a general statement, it might be said that all three meetings were well attended, presented interesting programs and attracted some of the best members of each respective organization. We will report Wisconsin and Michigan in March; Ohio and New York in April. The convention season is on!

★

Also in the issue is the next to the last part of the Ft. Wayne ordinance. After Ft. Wayne, we plan to publish one or two other detailed codes—each with merits of its own. So many requests have been received for copies of the Ft. Wayne code that Ft. Wayne is out of copies—incidentally, we have given out practically all our copies. If there is sufficient interest we may reprint Ft. Wayne in the interest of code advancement.

★

G. A. Voorhees' Pre-calculated Engineering continues with part 2 on page 45. The author takes an actual house and shows step-by-step how to calculate the heat losses using these pre-calculated tables. Several readers have said the window dimensions in their area are different from those of the tables. A conversion table will be offered later—meanwhile, why not re-figure the tables for your common sizes? A number of readers are doing this.

★

For four or five years the argument—return from the second floor or don't return—has been raging. Where price is no object, everyone returns. Where price interferes, second floor returns are omitted. That this can lead to serious trouble we all know, but actual instances have been lacking. B. L. Schwartz, on page 50, takes down his hair and tells what happened on a job of his.

★

And Professor Miller, popular exponent of better air conditioning, carries on with humidification by asking—"Why Humidify?" Fortunately for many readers, Professor Miller answers his own questions. If you want to lay in a little ammunition for competition or tough owners you will find real data for sales conversations in this article.

★

And S. Konzo continues his articles on how to check and test installations after they start working or after trouble develops. This article deals with proper methods of measuring air volumes. If you are not sure your methods are proper, this article may account for some of the funny results we all frequently get when using test instruments without correcting for possible sources of error.

AMERICAN ARTISAN

With which is merged

FURNACES AND SHEET METALS AND Warm-Air Heating

Covering All Activities in

Gravity Warm Air Heating — Forced Warm Air Heating
Sheet Metal Contracting — Ventilating
Air Conditioning

J. D. Wilder, Editor

A. A. Kennedy, Assistant Editor — Brewster S. Beach, Consulting Editor

Vol. 107, No. 2 — February, 1938 — Founded 1880

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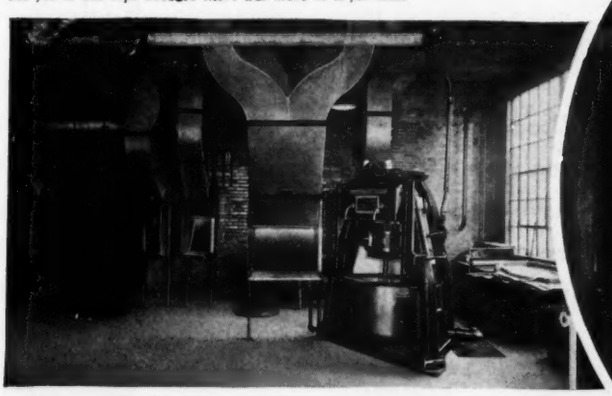
More than 8,000 Copies of this Issue are being distributed

As long as laundries care for CLOTHES *—and* COSTS!

Monel Chutes. *This chute job would be a good one to get in any material—but in Monel it's tops. The customer will not need repairs or replacements for years to come. For the sheet metal worker who did the job it was tops because there was more in it for him.*



Monel Starch Cookers. *These two were supplied to a prominent laundry on the Pacific Coast. Monel in no way harmfully contaminates the starch. Made of light gauge Monel sheet and equipped with Monel covers and Monel piping.*

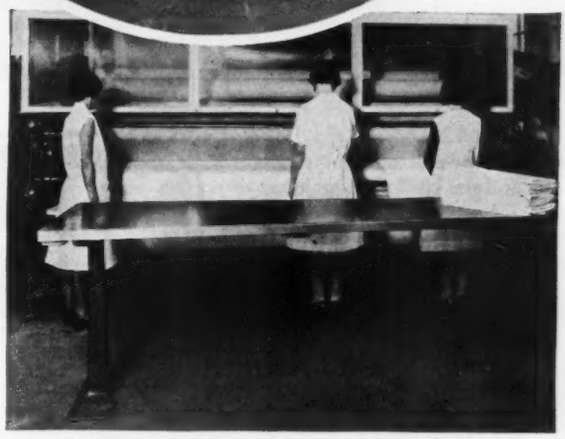
. . . they need these five jobs that YOU can DO

HOW long since you've made the rounds of the laundries near you? Right on this page are 5 good reasons why you shouldn't wait any longer.

Every job here made profits for some sheet metal man who knows his Monel.* They're all items the laundry uses . . . and Johnny-on-the-spot usually lands them.

Remember, the laundries KNOW Monel . . . you don't have much explaining to do. They've used it for years in their washers: they know it can't rust, and resists corrosion. They know it's strong and tough and long-lived.

So about all you have to convince them is that you're the chap who knows how to fabricate Monel. Write us to-day if you need information on forms and sizes available and prices. Then take this page along and start out to make calls: you'll find them profitable calls.



Monel Tables. *One of the outstanding sheet metal applications for Monel in the laundry. Using moderately light gauge Monel sheet, tables can be covered at economical cost. Monel-topped tables appeal to laundry operators as they are proof against rust and splinters; they are easily cleaned, attractive and durable.*

THE INTERNATIONAL NICKEL COMPANY, INC.
67 WALL STREET NEW YORK, N. Y.

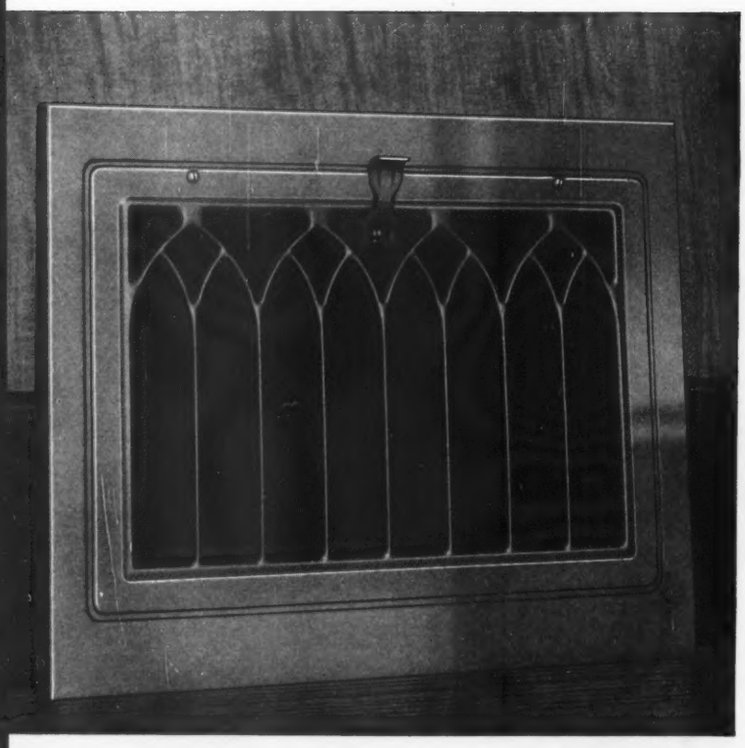
Monel Plant Trucks. *Practically every laundry uses plant trucks (usually about 24"x36"x24" deep) to transfer the cleaned wet garments from the washers to extractors and then to drying tumblers. Easily fabricated from light gauge Monel sheet .028" and .031" thick.*

Monel Shirt Dampener. *Steam vapors and condensate have no harmful effect on Monel—that's why this shirt dampener is fabricated from Monel. An ideal job for Monel; remember to offer it.*

MONEL

*Monel is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. This alloy is mined, smelted, refined, rolled and marketed solely by International Nickel.

three TOP-HEAVY FAVORITES in the Gravity Field!



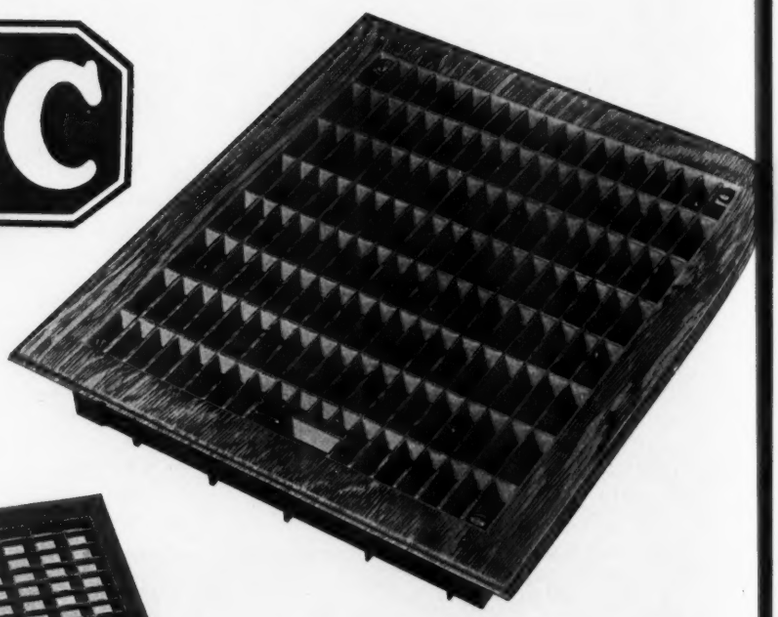
When any article of merchandise offered on the open, competitive market gets the big play that these registers have, you can be sure that there's more behind it than salesmanship. It takes definite and worthwhile superiority.

Drop in at your H & C Jobbers and inspect these registers. It won't take long to discover why they have become top-heavy favorites with installers everywhere. They've got what it takes to "click" with customers; attractive appearance, careful skilled workmanship, fine finish and all the qualities that make for neat, secure and satisfaction-giving installations. And there's a real advantage in handling registers of that character.

No. 37 General Catalog and No. 37 A-C Air Conditioning Catalog on request.

The H & C No. 120 Baseboard Register, shown above, combines the most popular face design ever incorporated in a baseboard register with a construction that permits the stackhead to be lapped over the register frame—insuring a very neat, tight installation.

H&C



In the H & C No. 265 "NO-FLEX" Return Air Face, many superior features of construction are combined. Mesh is 11/16" x 1-7/16". Cross members are welded to each other and to the frame for maximum strength. Upper edges of members are squared for better walking surface. Corner joints are invisible. Margins are narrow for close installation.

Shown above is the H & C No. 210 "NO-FLEX" Floor Register. Similar in construction and appearance to H & C No. 265 Return Air Face. Exceptionally rigid, with mesh openings 7/16" x 1-7/16". A very sturdy, heel-proof register for which no premium price is asked.

HART & COOLEY MANUFACTURING CO.

Warm Air Registers
Damper Regulator Sets
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Air Conditioning Grilles
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STEEL FURNACE PRICES REDUCED 15%

AGAIN . . . The Fox Furnace Company announces price reductions on air conditioning units and on gravity warm air furnaces. *And brings its steel furnace prices substantially lower* than cast iron furnace prices!

The importance of this announcement will be immediately recognized by Sunbeam Dealers everywhere . . . for it places them in an unbeatable competitive position. It will be *much easier to sell Sunbeam units than to compete against them.*

The Sunbeam franchise continues to mean greater net profits . . . a definite selling edge with new low prices . . . the finest and most complete line of warm air furnaces and air conditioners for oil, gas or coal. Selling Sunbeam means *leadership* in your community. Don't let this big 1938 opportunity escape. Send in the attached coupon TODAY for full details.

DON'T MISS THE SUNBEAM SCHOOLS

Air Conditioning Engineering Schools will be conducted by Sunbeam Jobbers in approximately 100 different cities during the winter and early spring months. Fox Furnace Engineers will assist in making these school sessions most instructive and helpful. Progressive heating and air conditioning contractors and their men are invited to attend. Return the coupon below for information on the school in or near your city.

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☐ Please send me information about the new low Sunbeam prices for 1938, and the name of the Sunbeam Jobber who serves my community.
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Address _____
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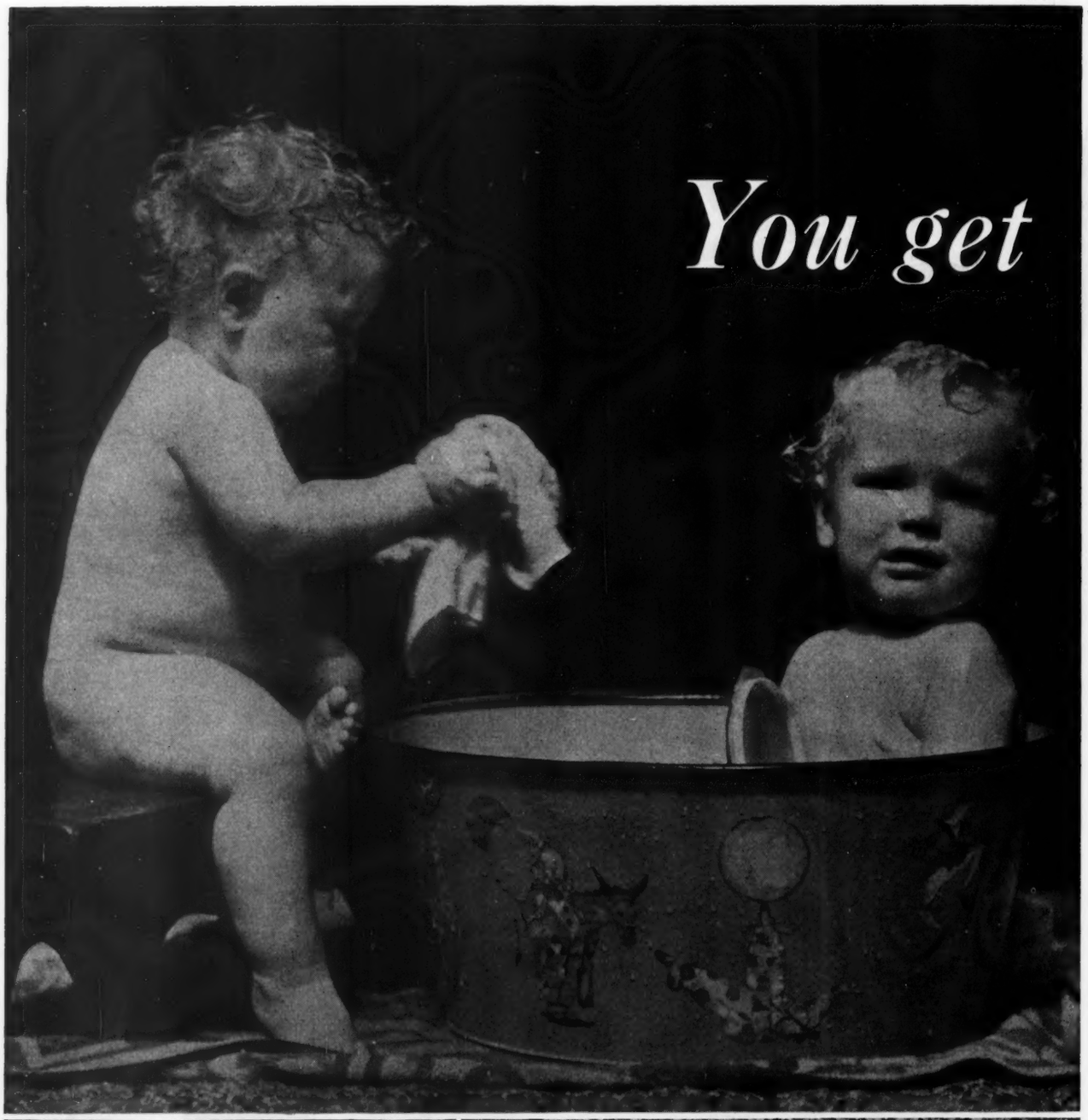
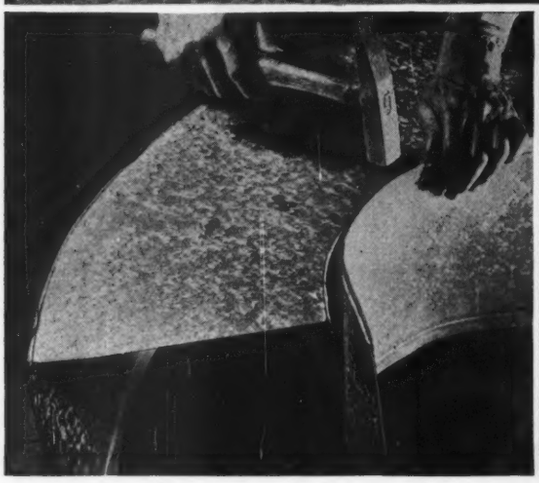
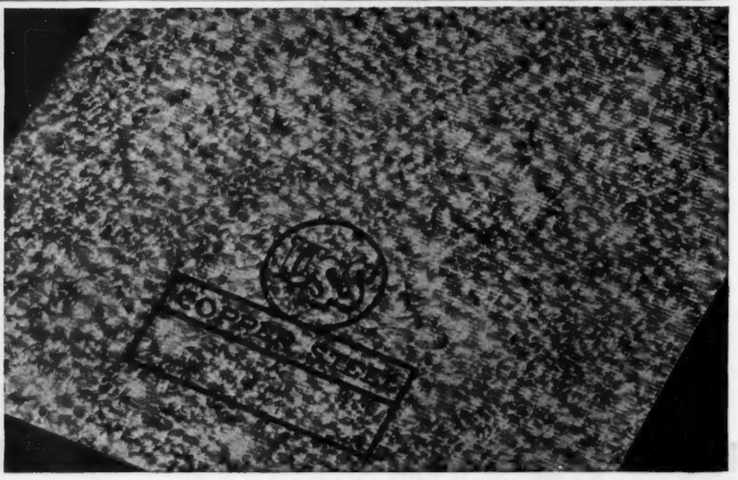
• A DIVISION OF AMERICAN RADIATOR AND STANDARD SANITARY CORPORATION •







EASY WORKABILITY *of U·S·S Galvanized Copper Steel prevents waste, saves time and labor. The tight coating does not crack under severe forming.*

LET THE SALES POWER *of the well-known U·S·S Trademark work for you. It is being advertised to millions of people monthly. U·S·S Copper Steel means greater durability and highest quality materials.*

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LIKE twins, Copper Steel has double life, costs but little more to get and gives the sheet metal worker something to brag about. But there the resemblance ceases—for twins are double trouble and double expense while U·S·S Copper Steel makes work easier and reduces fabrication costs.

Wherever galvanized sheet metal is exposed to rust and corrosion, U·S·S Copper Steel Sheets are the best choice. You can guarantee an A No. 1 job with complete confidence that it will give enduring service. For heating and air conditioning systems, roofing, spouting, ventilators and dozens of other uses where maximum life is desired, the small extra cost of U·S·S Copper Steel is negligible compared to the cost of a second installation.

U·S·S Copper Steel Sheets are stocked by leading distributors in all principal cities. They are easy to get. If you can't obtain them from your local supplier, write us direct giving his name and address.

FREE 64-PAGE BOOK

showing more than 100 ways to make profit with sheet metal.

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Address.....

City..... State.....

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LARGEST AND OLDEST MANUFACTURERS OF AUTOMATIC CONTROLS AND CONTROL SYSTEMS. BRANCH AND DISTRIBUTING OFFICES IN ALL PRINCIPAL CITIES.

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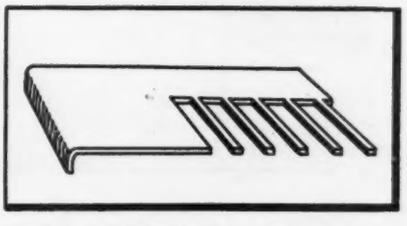
NEW!

BIG VALUE!

Independent Stamped Steel Air Conditioning Registers

● To meet a growing need, Independent has created this new register, correctly designed for high efficiency, uniform, accurate, handsome in appearance, made of quality materials, and sold at a low price. It is the product of Independent's long experience and fine craftsmanship, a superior register whose outstanding value challenges the attention of the entire industry.



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THE INDEPENDENT REGISTER CO.

238

3741 EAST 93rd STREET, CLEVELAND, OHIO

TRANE AIR^n Announces

AN OUTSTANDING CONTRIBUTION *to the* AIR CONDITIONING INDUSTRY

Use PSYCHROMETRIC CHART and AIR CONDITIONING RULER

The Trane Psychrometric Chart and the Trane Air Conditioning Ruler save 80% of the mathematical calculations normally required in Air Conditioning. They are integral parts of the Trane Air Conditioning Manual.

THE professional secrets of a leading air conditioning manufacturer are to be made public. The complete story of air conditioning — the *inside* story — is now to be told for the first time. The Trane Air Conditioning Manual — privately published for Trane field engineers and a limited group of independent air conditioning experts — is to be released to the entire industry.

In taking this radical step, the Trane Company is actuated by a desire to advance the art. We are not interested in the sale of books. There can be no monetary profit in distributing at $5.00 per copy—the established price—a manual that runs over $40,000 in research and writing costs, in addition to the value of that priceless ingredient — practical experience.

The Trane Company regards the dissemination of air conditioning information as a duty. Ever since air conditioning began its spectacular growth, Trane has known that the main limiting factor has been the lack of accurate, organized information in the hands of architects, engineers, and contractors.

Professional writers outside the industry have tried to supply the demand. But to tell the complete story calls for such definite and unusual qualifications that only an organization such as Trane could meet these requirements:

1. A broad-minded sales policy that recognizes the engineer, the architect and the independent contractor as vital elements in the development of the industry.

2. Extensive facilities for research — to check and correct contradictory data.

3. An experienced writer on engineering subjects such as Trane's William Goodman, to insure proper presentation of material.

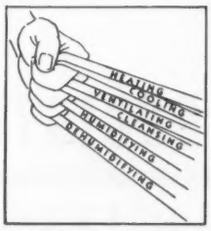
4. Ample resources to permit handling the problem in its entirety. And, finally, the "priceless ingredient" —

5. A rich background in air conditioning experience, *and a willingness to share this experience with others* — to make the work practical.

Quoting from Mr. R. N. Trane's introduction to the Manual:

"To collect, coordinate, organize and to make comprehensible and available the store of knowledge on Air Conditioning — to envision this field in its entirety — is the function of this Manual. I firmly believe that the achievement of such an end will be one of the major factors aiding the progress of air conditioning from the growing pains of adolescence to healthful permanence and maturity . . . I am proud that Trane Engineering has been the source of a notable contribution to a great industry."

AIR^n is a symbol used exclusively by TRANE to signify the *Nth* degree of excellence in Heating, Cooling, and Air Conditioning equipment.



The Trane Air Conditioning Manual contains 325 8½x11 pages, many of them printed in two colors to clarify illustrative problems. It is a scholarly, carefully-organized treatment of all phases of air conditioning, entirely free of sales propaganda, and containing a huge amount of hitherto unpublished material. It is durably bound in an attractive cover. A Trane Air Conditioning Ruler, a pad of 25 Trane Psychrometric Charts, and detailed instructions for their use are included with each Manual. The price, postpaid in the United States, is $5.00, with order.

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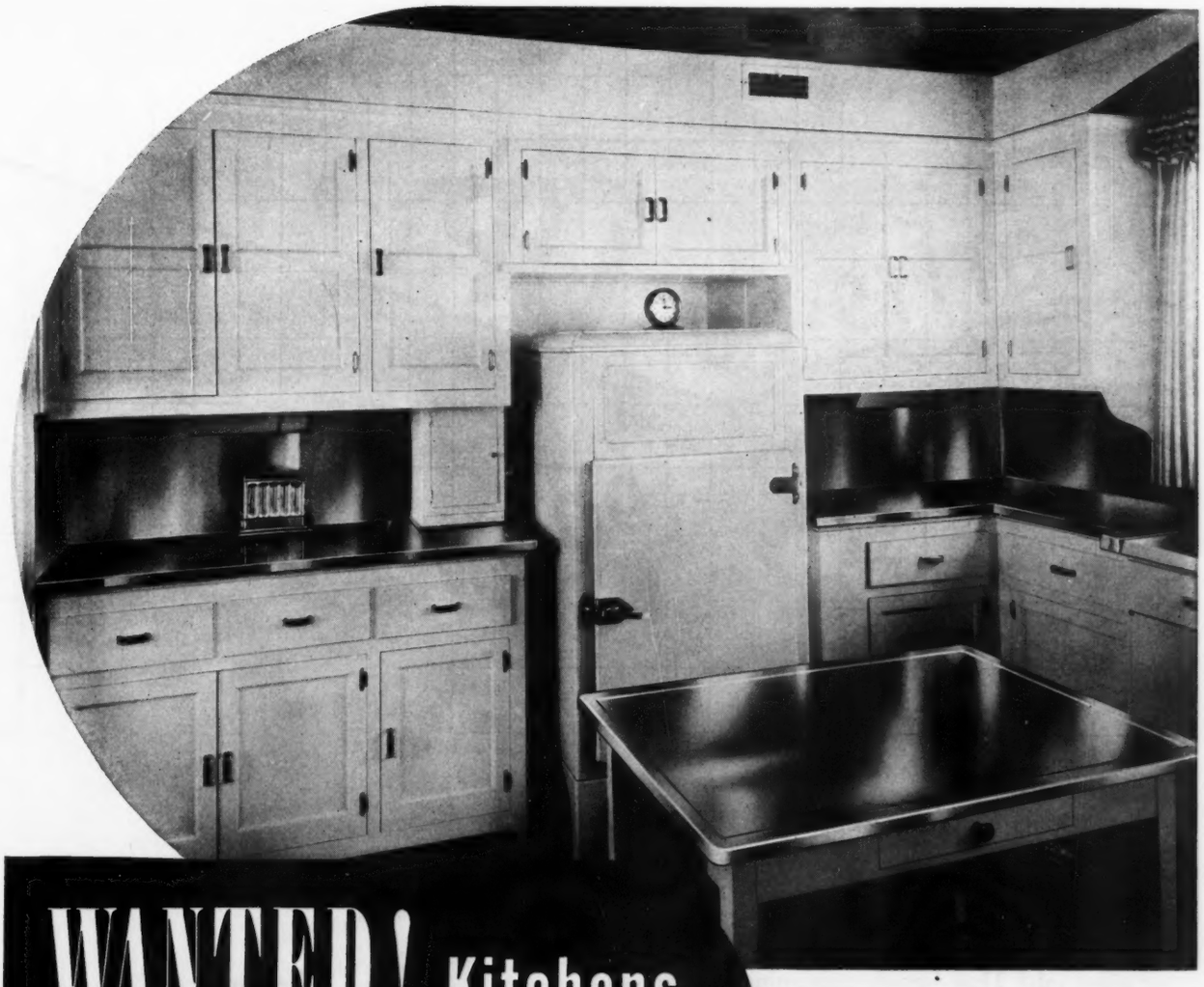
TRANE COMPANY OF CANADA, LIMITED, TORONTO, ONTARIO



WANTED! Kitchens that make Work a Pleasure

Note Armco Stainless Steel work boards. Similar boards are on either side of the sink. And all of them were installed by a sheet metal contractor.

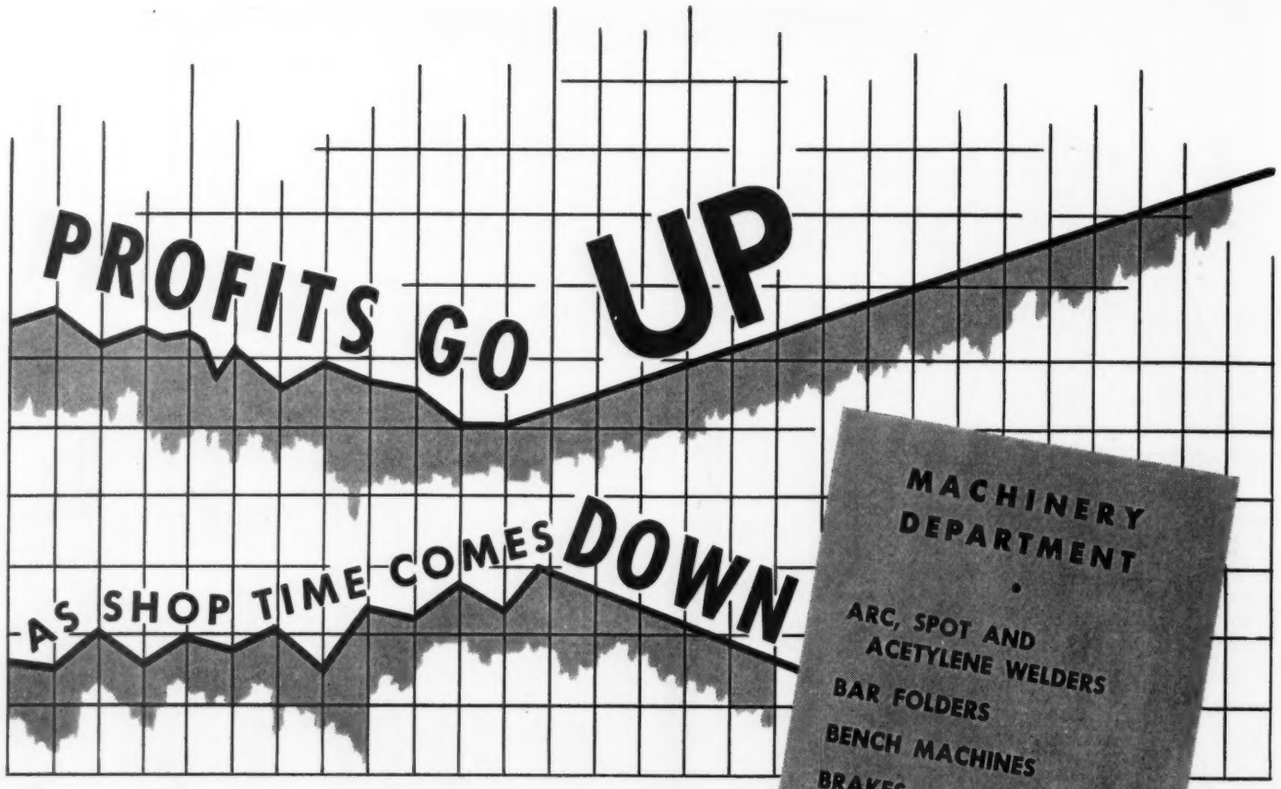
Today's standards demand beauty, cleanliness and easier working conditions in the kitchen. Women *want* these features and are willing to pay for them. You can help meet this demand and make profitable sales with Armco Stainless Steels.

Here is a metal that will not tarnish nor discolor. Its beautiful lustre is unaffected by food acids. It is not easily dented or scratched. Year after year Armco Stainless will retain its original beauty. Plain soap and water will keep it bright and shining for many years, all of which housewives appreciate.

You will find that Armco Stainless Steel forms easily and quickly. It can be soldered or welded without trouble. Recommend and use it for drain boards, sinks, work surfaces . . . wherever permanence, beauty and sanitation are desirable. The nearby Armco distributor can quickly supply you the right grade of Armco Stainless. Consult with him on shop or sales problems, or write direct to us. The American Rolling Mill Company, Executive Offices: Middletown, O.

ARMCO

ARMCO STAINLESS STEELS



YOU can buy materials at just the same prices as your competitor and probably figure the same hourly rate for your labor. The big question is, does it take you more or fewer hours to do any given job? That largely determines the amount of your profit.

No man ever succeeded in doing better work, faster, with poor tools and machinery. It can't be done. But many sheet metal men have told us that they are cutting shop time from 25% to 75% with new equipment purchased from us. Now—before the spring season opens—is the time to put your shop in line with, or a little ahead, of the procession.

Because our tool and machinery department is one of the most complete in the entire country, we believe that your OSBORN salesman can help you. Why not talk it over with him?

MACHINERY DEPARTMENT

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- BAR FOLDERS
- BENCH MACHINES
- BRAKES . . . HAND & POWER
- BOLT CUTTERS
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- FORMING ROLLS
- GROOVING MACHINES
- LATHES
- POWER PRESSES
- PUNCHES
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- ALL TYPES OF METAL WORKING HAND AND BENCH TOOLS

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A DEPENDABLE SOURCE OF SUPPLY FOR 79 YEARS

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Air Conditioning
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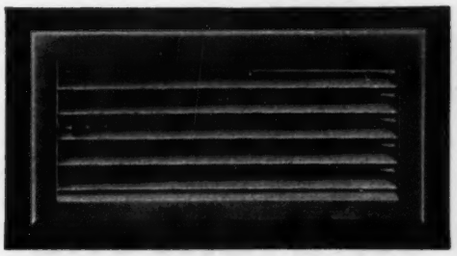
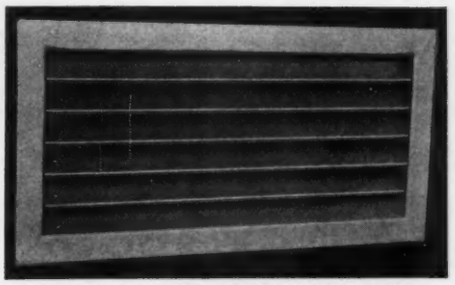


FH-100 — Adjustable Venetian Type Flat Register for Walls.



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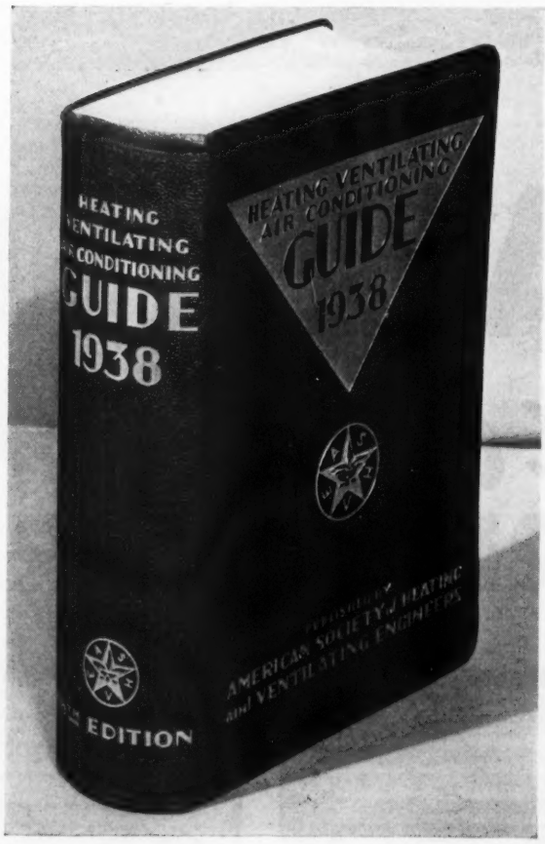

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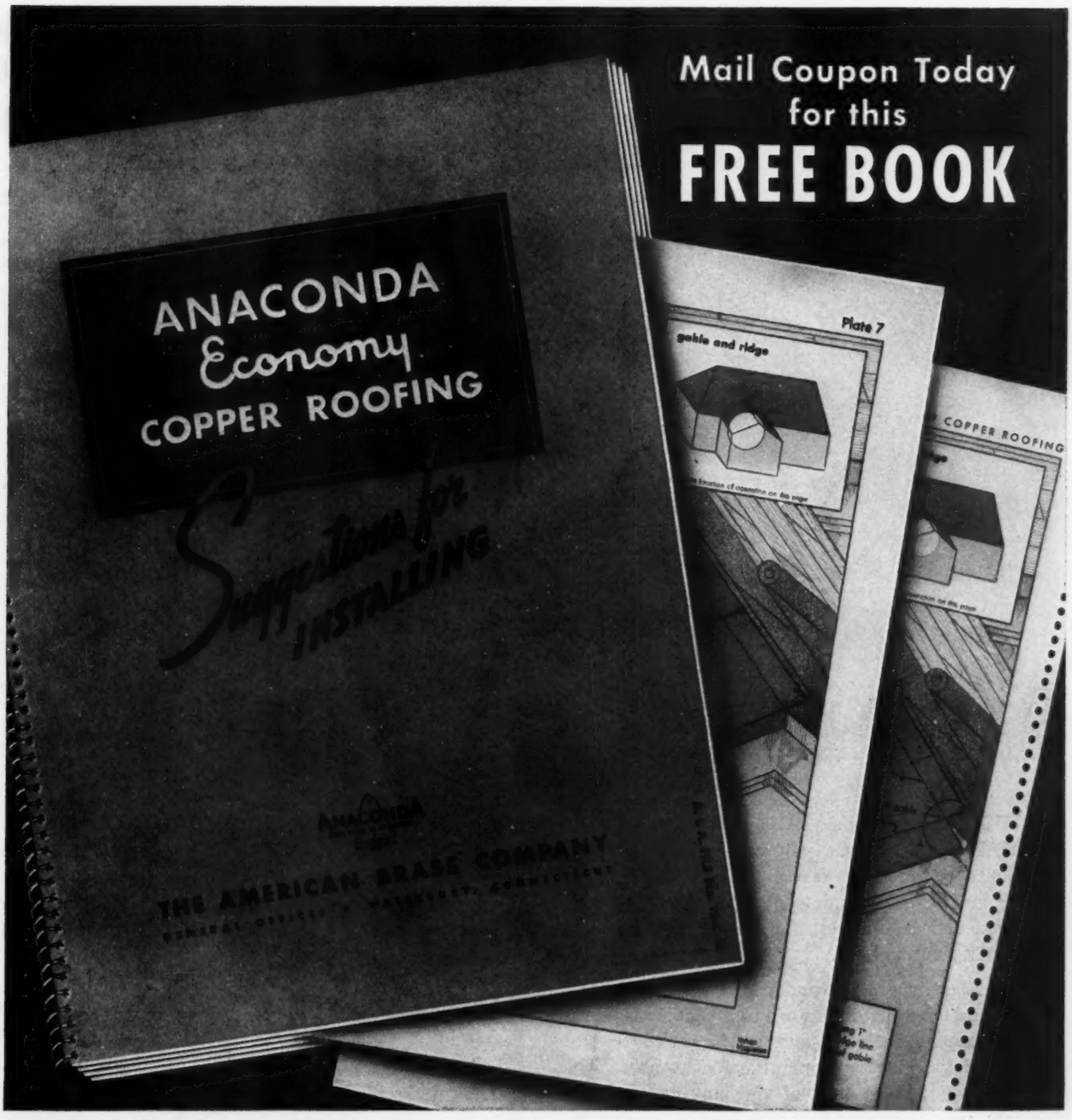

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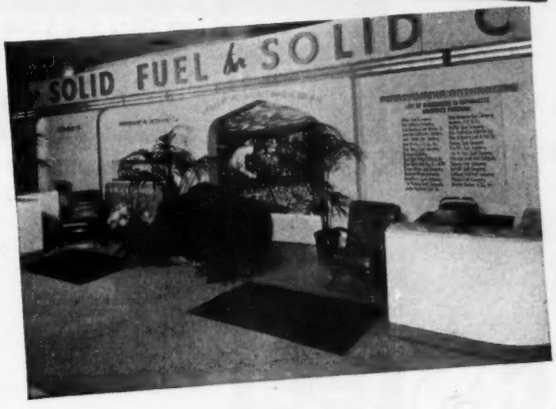

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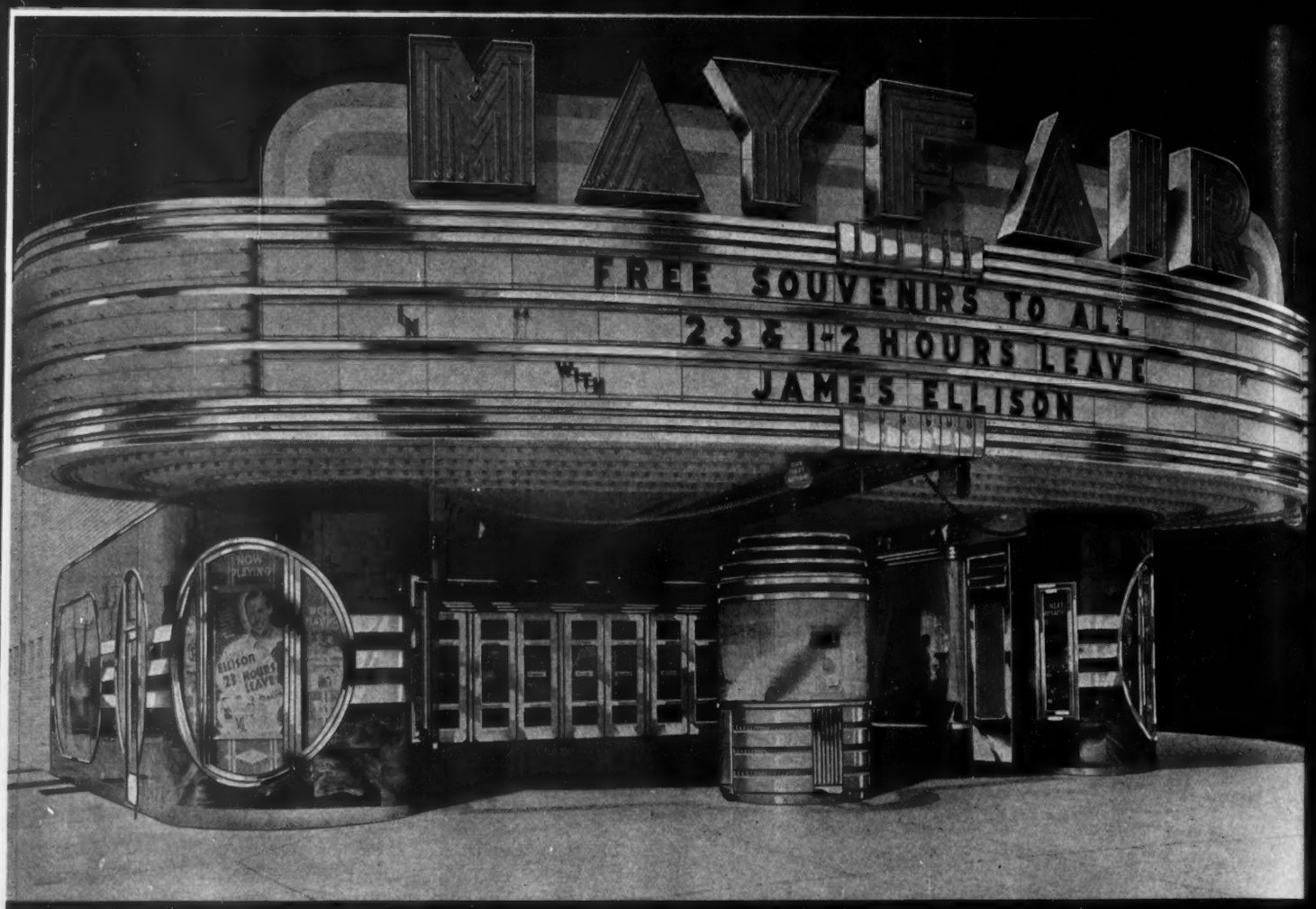

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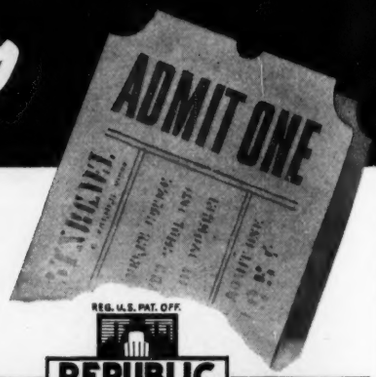

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AMERICAN ARTISAN

Volume 107 Number 2

A Nation Comes of Age

A SPEAKER at last month's National Warm Air meeting advanced the idea that our last major depression really marked the coming of age of a great nation. And that in this evolution are to be found some of the causes of the depression which fourth dimension economics cannot account for.

There would seem to be in this idea much more than the bare germ of a great truth. While some may debate whether the depression brought the coming of age or the coming of age brought the depression, we must admit that during the last seven years tremendous changes have been wrought in every phase of our national life.

On the assumption that there is merit in this suggestion, we can explore some of our problems against this back-drop. For instance, the problem of labor. Great concern has been expressed lately over the increasing spread of unionism in the sheet metal fabricating industry. Towns large and towns small are moving into the ranks of union labor. Economics will not account completely for this shift. But if we concede that there is no place "out west" for the man dissatisfied with local conditions; that a man no longer can just "pick up and move" in the hope of finding the income or conditions he seeks; that most men, nowadays, must learn one trade and stick to it; that the man with a reference is the man preferred; that the employer has neither the time nor the inclination to "try a man out" to see what he can do—then we have arrived at a motive which leads men to band together for protection, higher wages, steadier work, future security.

Or let us consider the employer—the man in business—established in his community, but dissatisfied with competition. In days gone by the answer to his problem was move to another community. Or go into another business. Today, this is easier to say than to do. We know a man who has been looking for months for a likely town where the competition is cleaner, less burdensome—so far without success.

The country has come of age. In every community, no matter how large or how small, there is the "sharp" competitor, the ignorant price cutter, the ladder and snip operator, the "big shop" with the established reputation, the factory branch, the mail order house. Each of these, in its own way, places definite limitations on the operations of all the others. In the scramble for any given order, reputation must compete with price; skill and responsibility must compete with buyer's determination to drive a bargain; knowledge must compete with carelessness, ignorance, deliberate chiseling.

There is, today, so much to know about any given phase of metal working activity, that it is easier to specialize than to learn all about everything. There are so many "specialists" on any given sale that only the specialist can know all the angles to materials, substitutes, production, labor costs, merchandising, design. In the daily drive for orders, all competition tends to sharpen itself, to bear heavier on each one's particular best qualification.

And so the employer, compelled by conditions to play the hand out seeks ways and means of bringing competition to his level, whether that level be higher or lower than ethics dictate. So we account, in some measure, for the restless, driving urge which bands employers into associations; which turns mens' thoughts to legal and political ways and means of leveling off environment; which proposes such standards as codes and licensing to weed out the unfit, careless, ignorant, unresponsible competitor.

Last year a scarcity of mechanics focused employers' attention on apprenticeship training and the evident reluctance of suitable young men to train for sheet metal work. In our fathers' time young men learned a trade knowing that opportunity awaited in many communities and, if the worst came to pass, they could turn their hand to other tasks. Today, there are no greener pastures over the hill, the man of several trades loses out to the man of one trade—how, then, can we condemn the young man who seeks future security through steady employment?

We, in the construction industry, may see within the remainder of this century stupendous changes in education, management, government control, based upon the premise that employees are no longer economically free—that a man must find his niche and be given every opportunity to find social security within that limited sphere; that the employer is no longer a free agent conducting his business regardless of his fellow craftsmen; that live and let live is the only path to national economic stability.

In short, that this nation has "come of age" and with the coming has lost some of that freedom which characterized our national life during the process of building. On such a premise, the social changes which startle us today may be trivial by comparison with the changes our grand children will inaugurate.

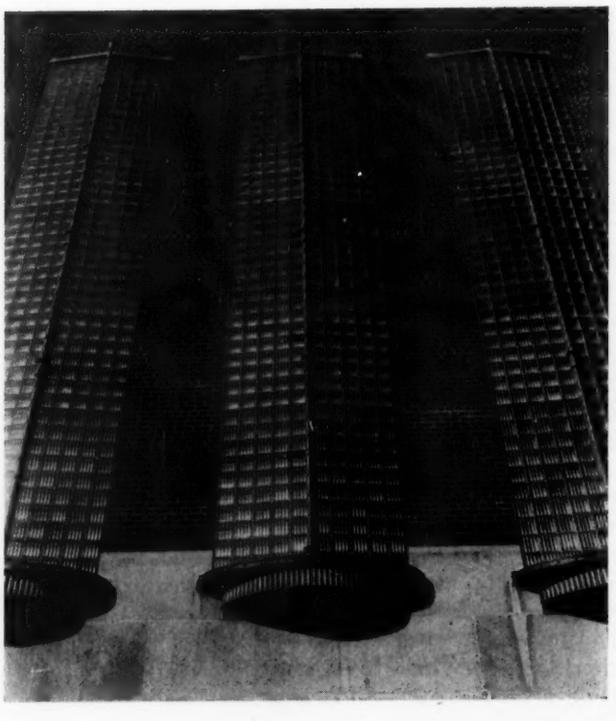
The appearance of the building as viewed from the street is eminently pleasing with its subdued, but rich, ornamentation. The closeup below shows details of the lead coated copper applications at glass areas. The color harmony between copper and glass is especially pleasing.

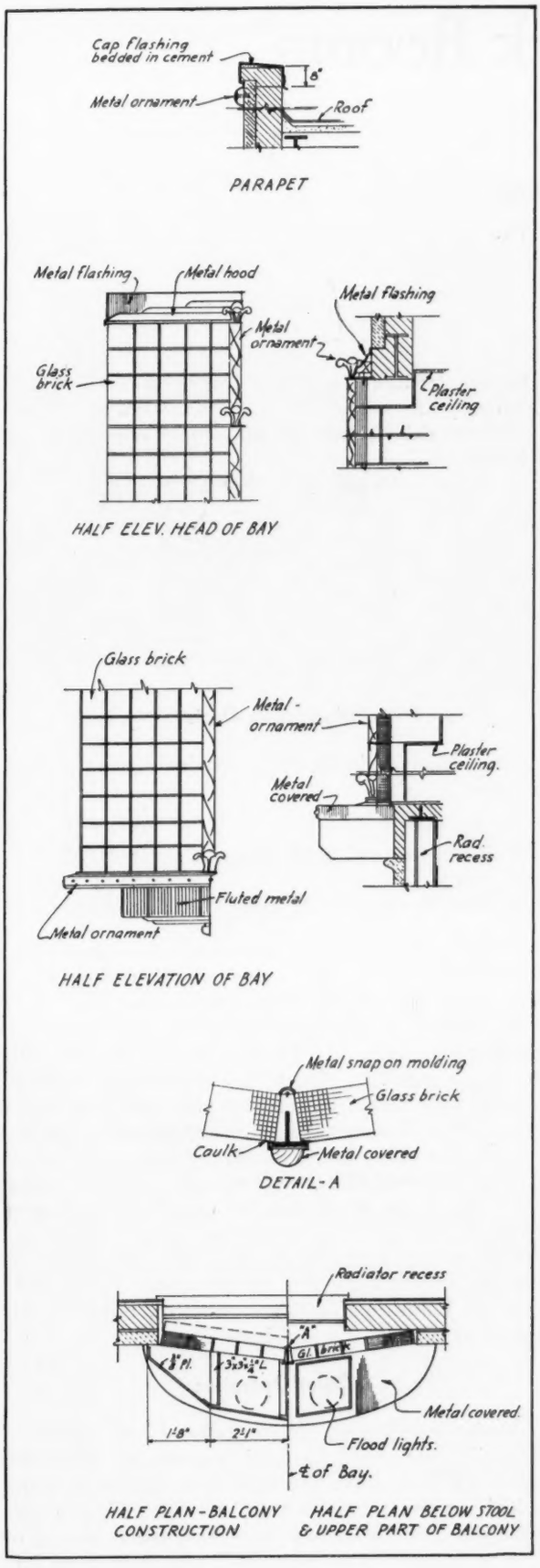
Lead-Coated Copper Enrichment

THE city of Milwaukee, Wisconsin for many years was widely known for the beauty and artistry of its ornamental metal work; even after other cities stopped using metal for ornamentation, numerous public buildings in Milwaukee continued to specify sheet metal for beauty and permanence. Since 1932, few exceptional installations have been made, but sheet metal contractors of Milwaukee feel that metal may yet stage a revival since the local architects are accustomed to metal and like the finished results.

Outlying Theater Ornamented

In 1937 a small, but interesting sheet metal project was completed on the Varsity Theatre by the sheet metal firm of Louis Hoffman Co., one of Milwaukee's largest, oldest and best known firms. The building, designed by the architectural firm of Grassold and Johnson, Milwaukee, is richly modern with high narrow glass brick panels; these ornamented and highlighted with lead coated copper light reflector basins, ornamented mullions and lead coated copper heads. The design and application





Group of details of copper application from the reflector basin to the coping cap, showing design and methods of fastening metal.

of this metal work is shown in the photographs and the details from the architect's plans.

Contractor Describes Work

Angelo Hoffman, executive head of the sheet metal firm, describes the design and fabrication of the metal work:

"The details of the sheet metal work were drawn by the architects' drafting room, but the writer was called in from time to time to advise as to whether the design could be followed without too great expense and trouble.

"Originally we intended to use wood backing for the work, but this was finally abandoned and we furnished our own bracing which in turn was fitted to wood blocking on the building steel.

Basins and Soffits

"The basin reflectors were built up over wood forms in our shop with the top open, erected in one piece and then the deck, light pockets and flashings were installed. The light pockets are removable through the glass panels through which they reflect the light.

"The soffit of these bays are built up of sections all of which have a different radius. The nosings of the bays were reinforced with bars so that a ladder leaning against them would not dent them.

Moulded Columns

"The moulded column was made up complete in our shop in sections to join at each ornament. As we were unable to find a pressed ornament to suit the architect, we built these up similar to a rough sketch we penciled on the architect's drawing. There was no detail as we made up a sample and simply followed that after it was accepted.

"The decks at the top were also hammered to shape in our shop over wood frame before placing on the job.

Coping and Trim

"The half balls at the coping were applied with brass bolts securely soldered to the inside of the ball and then screwed into anchors in the stone work.

"The coping is simple, being made in two parts, so that the flashing was installed after the composition roof was in place.

"The entire work with the exception of the half balls was built up and hammered out by our shop.

"The total weight of lead coated copper used was not so great, about 2,500 pounds but there was a great amount of expert labor that went into the job."

The appearance of the completed building is particularly pleasing to the passersby. The subdued coloring of the lead coated copper blending softly in practically all lights with the glass areas. The project demonstrates what can be done when an experienced sheet metal contractor cooperates with the architect.

Ventilating "Dark Rooms"

By R. F. Jeske
Milwaukee, Wis.

THIS article describes what may be considered ordinary ventilation. Yet it is unusual, because the rooms ventilated are so-called dark rooms into which light may not enter and these rooms are always in that portion of the establishment without windows, or the windows are closed up. Doors are also kept closed. Consequently air cannot enter these rooms and they become foul and oppressing to the detriment of employees therein. Air can only be admitted to these rooms in a manner that will exclude light.

Air Inlets to Rooms

The method of supplying air in this case is illustrated by the drawings. The inlet ducts shown take air from near the ceiling where it contains less dust than at the floor of the general or large section of the establishment and conduct it by gravity into and deliver near the ceiling of the rooms to be vented. These rooms are designated on drawings by A, B, C and D. Note, that vent or exhaust ducts terminate near the floor and are located about opposite to the supply inlets. This method permits cross and downward flow of incoming air to the vent risers. The entire floor of this establishment is 39′ × 110′ × 12′ high and air taken from the general or main section is replaced by infiltration and by keeping windows open somewhat at the remote ends of the floor, where incoming cold winter air will not affect employees.

Air Supply

Rooms "A" and "B" require normal ventilation only and calculations were based on a five minute air change for these two rooms. In room "D" and "C" some acid is used in a developing process and these rooms are being supplied on a three minute air change basis. At "E" there is no room but only a table top, containing a sink in which an acid wash is used. The fumes from this acid are small in volume. The table top, which is also the level of the sink, is about 2½ ft. above the floor. The sink is about 2½ ft. long. Calculations were based on an imaginary vertical area between employee and the sink of about three feet wide by four feet high or about twelve square feet and at a velocity of fifty feet per minute, we arrive at 600 cfm. At "F" there also is no room, but just a machine from which emanates a very small volume of odors. This was treated in a similar manner as "E" and an arbritrary amount of 200 cfm was arrived at. From the above calculations the air supply required is as follows:

Room	"A"	540 CFM
Room	"B"	1,570 CFM
Room	"C"	435 CFM
Room	"D"	900 CFM
At	"E"	600 CFM
At	"F"	200 CFM
Total of		4,245 CFM

Velocities in Ducts

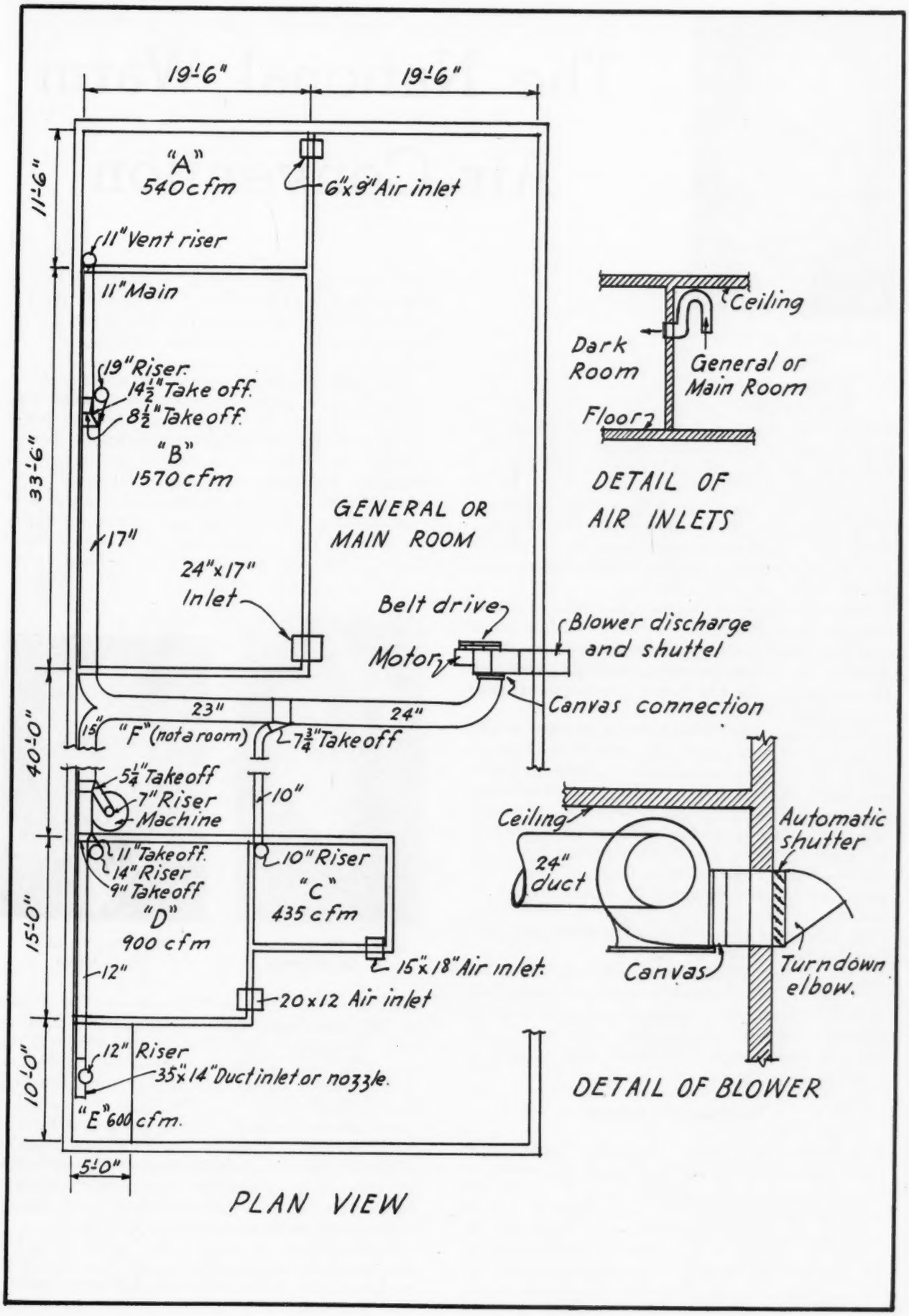
The velocities in ducts in this installation are as follows:

Air inlets	600 FPM
Branches and Vent Risers	800 FPM
Main Ducts	1,350 FPM
Branch Taps into Main	1,350 FPM

I may add, that to increase or decrease the velocities will not make a material difference except that to increase them will mean smaller duct sizes and a saving in sheet metal cost, but it will increase the horsepower required to operate the system, with a higher monthly charge to operate the system. On the other hand, to decrease velocities, will mean larger duct diameters, with a corresponding higher installation cost, but a lower horsepower electric current consumption every month. The velocities here given are what can be considered a happy average, taking into consideration the initial installation cost and also the monthly operating cost, coupled with satisfactory performance. Please note that all joints in ducts, not grooved, must be soldered to prevent suction losses.

Quiet Operation

Under conditions, where noise is no factor, a propeller fan could be used, capable of delivering 4,250 CFM against the resistance in the system, which amounts to about ⅜" to ½" S.P. In this case quiet operation was essential and a blower of the multiblade type was used, requiring a ¾ h.p. motor to operate the system and connected by means of a "V" belt drive. The blower discharges through an outside window and the discharge duct is fitted with an automatic shutter.


19'-6"
19'-6"
11'-6"
33'-6"
40'-0"
15'-0"
10'-0"
5'-0"
"A"
540 cfm
6"x9" Air inlet
11" Vent riser
11" Main
19" Riser
14½" Take off.
8½" Take off.
"B"
1570 cfm
17"
24"x17"
Inlet
GENERAL OR
MAIN ROOM
Belt drive
Motor
Blower discharge
and shuttel
Canvas connection
23"
24"
15"
"F" (not a room)
7¾" Take off
5¼" Take off
7" Riser
Machine
10"
11" Take off.
14" Riser
9" Take off
"D"
900 cfm
10" Riser
"C"
435 cfm
15"x18" Air inlet.
12"
20x12 Air inlet
12" Riser
35"x14" Duct inlet or nozzle.
"E" 600 cfm.
PLAN VIEW
Ceiling
Dark
Room
General or
Main Room
Floor
DETAIL OF
AIR INLETS
Ceiling
Automatic
shutter
24"
duct
Canvas
Turndown
elbow.
DETAIL OF BLOWER

President—L. R. Taylor

The National Warm Air Convention

CELEBRATING the 20th anniversary of research activity and marking the fifth biennial international heating and air conditioning exposition, the 41st convention of the National Warm Air Heating and Air Conditioning Association held January 24, 25 and 26 in New York City, reflected the confidence of the warm air heating industry in the accomplishments of the past twenty-four years of co-operative activity and the expectations for good business in 1938.

The total registration of manufacturers, salesmen, dealers, visitors exceeded, so far as officials could estimate, any meeting held in the last few years. At the same time, registration of the American Society of Heating and Ventilating Engineers, was the largest ever recorded.

The optimism and confidence in business conditions for 1938 were generously reflected at the exposition where more manufacturers, more products, and more visitors were recorded than at any previous exposition held. All records for attendance from the industry, for display space purchased and for public interest were broken during the week. Manufacturers reported more sales and more prospects than at any previous show and no one attending the exposition or convention could carry away any other than a favorable reaction to 1938's business possibilities for this field.

This confidence was reflected by President Rybolt who, in his president's message, pointed out that this meeting, marking the 20th year of research activities, finds the organization in the very favorable position of being the outstanding example of trade co-operation.

The President's Message

Said President Rybolt "The result of our research work and of the research staff at the University of Illinois have become world known. This research work has placed the industry in the enviable position of being well abreast of all current and future demands for information. Much credit should be given to the individuals who formulated the research program and those who have been active during the 20 years of activity. I refer to President A. C. Willard, Professors A. P. Kratz, and S. Konzo, F. G. Sedgwick, who has been chairman of the Research Advisory Committee for many years, and all the individuals who have given their time and efforts to the work."

Admitting that business, and the warm air heating industry, in particular, is now in a business recession, President Rybolt declared that we should not to be too pessimistic, as everyone knows there is much money lying idle in banks; that there is a universal willingness to advance business conditions, but the drawback seems to be a lack of general confidence in present and future legislative activities of the Federal states and local political bodies. Pointing out that sales of furnaces increased from 310,000 in 1918 to more than 500,000 in 1925, and dropped to approximately 300,000 in 1936, President Rybolt declared that 1937 will undoubtedly show a general increase of from ten to fifteen per cent over 1936 and that from all indications 1938 should better 1937 by at least another ten to fifteen per cent. Emphasizing that there is every indication of an increased building boom in 1938, particularly in residential construction, and that our industry is in a position to meet practically any public demand, President Rybolt declared that all factors point to better conditions in 1938.

Second Vice-President
F. G. Sedgwick

First Vice-President
C. A. Olson

President A. C. Willard of the University of Illinois, unable to attend, sent a letter in which he reemphasized the willingness of the University and the staff to co-operate to an even greater extent than

heretofore in the research activity of the National Warm Air Association.

What's Ahead in Building

Thomas S. Holden of the F. W. Dodge Corporation, New York City, discussing "What Is Ahead in Residence Building in 1938," declared that two things were principally responsible for the recession in construction during the last quarter of 1937. The first cause was the fact that wage and material price increases brought a buyers' strike. The second cause might be found in the fact that while private building construction increased approximately 31 per cent, government spending fell off considerably, the net result being to maintain a high level of construction during the first three-quarters of 1937. With a drop in private construction in the last quarter, this last quarter showed a considerable drop in construction; the net result was a general increase of approximately nine per cent by dollar volume over 1936.

Mr. Holden pointed out that many of the estimates for 1937 construction were based upon supposed shortages of buildings, whereas the report of the National Housing Committee shows that the $2,000,000 units shortage is actually in the type of structures which can be rented by the income earner receiving $30 or less per week.

Also, speculative building failed to materialize because many of the factors which previously led to booms are now absent. Among these missing factors, according to Mr. Holden: there has been a sharp decrease in immigration; population growth has tended to stabilize itself; there has been no recent opening up of new territory; automobiles have become more desirable than some things like houses; urban expansion has been falling off, as a consequence of which, many of the large city building programs have failed to materialize.

Mr. Holden suggested that the 1931 depression really marked the coming of age of a great nation and that past speculative booms such as we knew prior to 1931 may never appear again. Also that structures are not consumed so we need new types of construction and remodeling to meet changes in living standards. The tremendous growth in recreation is causing complimentary changes in housing and housing needs. That construction can not loosen up until tax policies of local, state and federal governments are settled and confidence is restored.

That one method of stimulating house construction may be to reduce the overall cost of houses through radical changes in design and perhaps in types of materials employed; but most of all by some means for reestablishing a desire for home ownership.

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DIRECTORS

R. M. Judd.
H. P. Mueller.
H. S. Sharp.
Shirley Percival.
Perl S. Miller (Unexpired Sedgwick Term).

The Legislative Straightjacket

Congressman Emanuel D. Celler of New York, speaking on "The Legislative Straightjacket on Business," declared that the undistributed profits tax law is one of the most vicious laws in existence. That in his estimation, this undistributed profits tax should be repealed outright, as should the capital gains tax. That most of the proposed changes are not drastic enough, and there should be no particular reason why a small business is treated better than a big business, since surveys show that large business has and is giving more employment to workers than small business.

Congressman Celler declared that President Roosevelt said the undistributed profits tax was to replace other Federal levies, but actually this tax has been added to existing taxes, thus pyramiding of tax upon tax has served to destroy confidence with the result that the largest question facing business today is means for stimulating all business to hire more men. If the undistributed profits tax is repealed the loss of revenue can be repaced without additional taxes because increased confidence will increase all business. Also, if increased revenue is required, it is only necessary to apply taxes upon present tax exempt securities of the Federal, State and local political bodies, or individual income taxes might be applied on governmental employes of the Federal, State and local governments.

Mr. Celler suggested that all members interested in this tax problem should get in touch with congressmen and senators and make their ideas emphatically known.

Cooperating With Architects

C. A. Kissinger of Youngstown, Ohio, the architect for the Research Residence, speaking on the subject "The Value of Co-operation between the Architect and Our Industry" declared that as an industry we have received wide publicity and public acceptance and whereas home owners formerly apologized for a furnace and contractors were glad to get from $85 to $300 for a complete installation, today forced warm air heating and air conditioning is the first choice of most owners.

Mr. Kissinger pointed out that architects for many years have been actively co-operating with piping contractors in the preparation of plans and selection of equipment, but have never enjoyed a similar co-operative effort with the manufacturers or dealers of warm air heating apparatus.

That the burden of proof of the advantages of a warm air system lies with the contractor and architects generally are more than anxious to re-

ceive all information on the merit of warm air heating.

One Professor's Ideas of Important Research

At the joint meeting with the American Society of Heating and Ventilating Engineers Professor A. P. Kratz, speaking on "Fundamentals Developed from Twenty Years of Research" refreshed member's minds on the first meeting at which the Research staff appeared on the program. "Members of the Research Staff were received pleasantly, but that was about all," declared Professor Kratz, "and at that first meeting and at subsequent early meetings the Research Staff dared not show any formulas but only charts of research work."

Declaring that his suggestions represented only one college professor's ideas of the fundamental development of 20 years of research work, Prof. Kratz proceeded to outline some of the things which in his estimation were outstanding. Foremost among these was the establishing of a uniform method for rating furnaces. That when the furnace rating formula was first undertaken it was estimated that not more than two years would be required, whereas final figures were not obtained until seven years later. The second interesting development was the establishing of the heat loss from pipes, including the heat loss from bright tin as compared with bright tin covered with asbestos paper, or galvanized iron.

The establishing of the overall heat loss from a furnace and the heating system, was declared to be important since this particular piece of research led to the establishing of net and overall heat losses and ultimately to the discovery that efficiencies must take into account losses to floor, air, up the chimney, in the materials of combustion and other factors. As a fourth important development, Prof. Kratz cited the establishing of the capacity of leaders and stacks. Highly important was the series of investigations covering the discharge of air from floor, baseboard and ceiling registers with charts to show required air distribution, register air temperature, and register face velocities. Professor Kratz devoted considerable attention to the results in floor, breathing level and ceiling temperatures, also floor, breathing level and ceiling air velocities, and necessary register velocities and air changes per hour required to minimize the temperature differential between floor and ceiling and to eliminate stratification in gravity systems; also with intermittent fan operating systems.

As a last important development, Prof. Kratz cited the general research covering night air cooling and the resultant comfort conditions secured, emphasizing that night air cooling resulted in reduced temperatures during the first part of the following day and also made possible a reduction in the size of refrigerating equipment required to mechanically cool the air within a structure.

Air Distribution

"Air Distribution from Sidewall Outlets" was the subject of a paper by D. W. Nelson and D. J. Stewart. This paper covered in detail satisfactory air distribution, air velocities within a room at various room temperatures at different register velocities, while charts showed the air distribution along vertical lines for open hole and bar grilles of different sizes with particular emphasis on the effect of grille size upon the air throw at an initial face velocity of 1,000 fpm. This paper will be reprinted in full in succeeding issues of American Artisan.

Condensation in Walls

"Condensation Within Walls" was the subject of a paper by Prof. F. B. Rowley of the University of Minnesota. In brief, the results of the investigations under way at the University of Minnesota bear out some of the facts presented in the discussion of condensation within walls published in the January issue of American Artisan.

As a general conclusion, Prof. Rowley declared that there is no doubt but that condensation of moisture in walls is a troublesome problem with many types of construction under adverse conditions and that in the past many difficult situations have arisen due to a lack of understanding of the true nature of the problem and that different building materials have been combined without regard to the effect of these combinations on the thermal and vapor properties of a wall.

Directors R. M. Judd and H. S. Sharp

Also, since the temperature of the various parts of a wall are controlled by the type and amount of insulation used and the vapor densities in the corresponding parts are controlled by the vapor barriers used, the transmission of heat and vapor through a wall must be considered together and an intelligent combination of insulation and vapor barriers will eliminate any possible chance of trouble. A fundamental principle often overlooked, according to Prof. Rowley, is that the vapor barriers must be placed on the warm side and not the cold side of a wall.

Temperature Drop in Ducts

At the Research session on Wednesday morning, R. B. Engdahl research assistant, presented a discussion of heat losses in forced air ducts. Working from the cfm factor chart used in the new Technical

Code and explaining how in the code the actual cfm required for each room is obtained from the actual register temperature prevailing in that room by the use of the chart and the chart factors, the speaker showed a supplementary diagram taken from tests in the Research Residence, showing the temperature drop for the ducts in the Research Residence system. The spread in temperature drop per foot of running length varied from .4 to 1.9 at 140 deg. register temperature. In response to questions as to why this wide variation with all of the drops appearing above the .25 recommended in the code, the speaker explained that these readings were taken in the branch ducts and do not take into account the pipe in the mains.

Undersized Compressors

S. Konzo, reporting tests in the Research Residence during the summer of 1937, using a refrigerating compressor purposely undersized at 60 per cent of the calculated capacity requirements, reported that this 1½-ton unit with a capacity of 17,500 Btu. per hour showed that on a day when the maximum temperature exceeded 91 deg. and using night air cooling the night preceding, this undersized unit maintained an effective temperature right under 75 deg. during the period from 11 o'clock in the morning until 10 o'clock at night.

Also, using this particular unit, the relative humidity was maintained at or below 59 per cent, whereas the 30,000 Btu. capacity unit used during the summer of 1936 was able to maintain a relative humidity of 45 per cent. These tests indicated that it was possible to maintain a dry bulb temperature not exceeding 79 deg. during most of the summer period, so long as the unit and fan operated, but during off cycles of the fan and the unit, the conditions within the residence were not satisfactory.

Mr. Konzo pointed out that during average Urbana summer weather, this small unit showed satisfactory operating conditions due to the fact that the unit ran practically continuously, whereas the 30,000 Btu. capacity unit ran intermittently and as stated previously, conditions are not as satisfactory with the unit and the fan off, as when the unit and the fan are operating. The ideal condition would be a machine just large enough to run continuously; therefore requiring a unit with a variable capacity.

"Median" Temperature

Mr. Konzo introduced a new term 'median" temperature, which is a combination of average outdoor maximum and minimum temperature in any 24-hour period. So long as the median temperature was 75 deg. outdoors, this undersized compressor unit was able to maintain conditions not exceeding 79 deg. F. and that when the median temperature varied from 79 to 83 deg. F., the compressor was able to keep the house below 80 deg. which was considered a pretty good job. Whenever outside conditions exceeded 83 deg. median temperature, the small unit was not satisfactory.

Carrying this reasoning to its logical conclusion, Mr. Konzo pointed out that in Urbana, weather bureau records for the past eleven years show an average of 153 days during an average summer during which cooling is required. On 108 days out of the 153, the median temperature is less than 75 deg. and leaving 45 days during which a large full-sized compressor would be required. The Research Residence staff believe that on 143 days out of the 153 days, this under-sized unit would be able to maintain satisfactory conditions.

Two Zones in Research Residence

Another series of tests zoned the Research Residence into two zones—one zone consisting of the first floor and the second zone consisting of the second floor. Dampers were so placed that it was possible to throw the full force of the fan into either zone and the test was operated to cool the lower floor during the day and the second floor during the night. It was discovered that cooling the first floor dropped the relative humidity on the second floor, thereby changing the effective temperature of the second floor, but the change was slight. The system was changed to operate on the second floor at 6:30 in the evening, but the Research Residence staff found that it took from two to three hours to bring the second floor down to a comfortable condition. The Research Residence staff therefore seems inclined to believe that continuous cooling of the total structure is to be preferred to zone cooling, particularly if an undersized or just correctly sized unit is employed.

Our Installation Codes

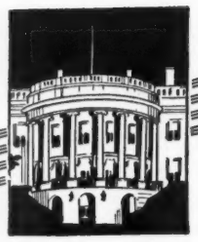
Reporting on the status of installation codes, Prof. J. D. Hoffman of Purdue University, said that more than one and one-half millions of copies of the Gravity Code had now been passed out. The first Mechanical Code has passed the 50,000 mark and the new Technical Code has sold to the extent of between 7,000 and 8,000 copies. Prof. Hoffman declared that Table A (Co-efficients of transmission for different types of wall construction) will be changed to conform to the co-efficients used in the 1937 edition of the A.S.H.V.E. GUIDE. Also in view of the fact that the Research Residence test shows higher temperature drop per foot of duct, than the .25 used in the technical code, consideration will be given to changing the factor used in the new technical code. A paragraph will also be added to the new Technical Code to cover furnace rating sizes where intermittent operation is employed.

Michigan State Short Course

Reporting for the Technical Educational Committee, Prof. L. G. Miller of Michigan State College stated that the Committee is considering a Short Course of from six to eight weeks duration at some college to cover forced warm air heating, winter air conditioning and perhaps summer cooling. Prof. Miller also announced that the annual Short Course will be held at Michigan State University, East Lansing, March 27, 28, 29 and 30. Also that this

(*Continued on page 76*)

Arnold Kruckman's Washington Letter



IN the annual report recently issued by the Attorney General of the United States there is a section devoted to the activities of the Anti-Trust Division. Assistant Attorney-General Jackson, in charge, marshalls the arguments against the monopolies which he has made startlingly well-known in the series of addresses delivered during the past three months. There is nothing really new in this summary. But he presents a table of business failures since 1928 that is amazing. The table is taken from a report by Dun & Bradstreet and concerns business units with obligations of $25,000 and less.

Failures Increasing

In 1928 the failures, involving firms of $25,000 and less, amounted to 83.4% of the whole. In 1929 the percentage was 82.9; in 1930, 81.9; in 1931, 80.1; in 1932, 80.8. However, in 1933, when the depression was at its lowest and the New Deal Administration came into power, this table shows that failures in the $25,000 (and under) bracket, rose to 82.8 percent, which is not so remarkable in view of the extraordinary conditions prevailing. In 1934, when many emergency agencies were in full career, and huge sums of relief money, P.W.A. money, farm compensation money, and soldiers' bonus money, were flooding the arteries of commerce and finance, it is startling to learn that the failures among the small businesses of $25,000 and under rose to 84.9 percent of the whole, while in 1935 the percentage increased to 87.4; and in 1936, the last year reported, the failures in this category were 88.5 percent of all failures reported.

Suppression of Little Business

The astounding aspect of this tabulation is, obviously, that while we were spending more billions per year than have ever been spent by any nation in peacetime in the world's history, piling up a national debt of more than 37 billions, the failures among the small business men were increasing literally by leaps and bounds. Assistant Attorney General Jackson does not say so in so many words, but it is apparent that he wishes to leave the impression that these failures are due to the overwhelming growth of the monopolies. Speaking broadly, General Jackson has in mind that this suppression and destruction of small, independent units, is the result of the same law that caused the obliteration of the small, independent units in the economic life of Rome when its aristocrats became enormously wealthy and formed small and powerful combinations which probably were the original coalitions known as monopolies.

The Chamber of Commerce of the United States naturally does not agree with this assumption. Nor do the majority of business and industrial organizations. Most of them feel that the greatest part of our contemporary economic instability is due to the uncertainties growing out of the shifts and changes in the mechanics of conducting government. The average business man has grown accustomed to the thought that we are in the maelstrom of a stupendous social change, affecting all the world, and that we must accept the inconveniences, distresses and casualties.

Undistributed Profits

But some of the penalties exacted from him he regards as unnecessary. That is why the so-called small business man so hotly opposed the undistributed profits tax. He is conscious of many obstacles and burdens that he cannot clearly analyze; they are like the swarms of gnats and flies you cannot lick. The undistributed profits tax, however, is definite and sharp in its troublesome effects, and is something he can clearly realize.

He also feels that many other taxes are burdens that somebody—some way --should do something about; but he does not know just how to attack the problem, and so he continues, unhappily, to carry on.

A national trade organization recently made a survey of the tax situation among local business men in and around the $25,000 bracket, and found many making returns to the Federal government, the State government, city government, county, school districts, and other political subdivisions, and that the separate returns to the various phases of government amounted to more than 900 separate returns by a single business unit. As a sample, it was shown that one hardworking businessman who was struggling valiantly to survive, spent approximately $500 per year to employ a competent person to make the returns in their proper form. There is, of course, the classic example of the Curtis Publishing Company, which does business in every State of the Union. This corporation in 1937 made approximately 50,000 tax returns, paying for the service of making the returns approximately $22,000. By contrast it reports that in Canada it made one return.

Cost of Tax Returns

Commercial and trade organizations have told Congress that the very cost of making returns, not including fees for legal advice, nor any other expenditures connected with this complex system of tax exaction, actually has tipped the balance between commercial solvency and insolvency with many business units. The subcommittee of the Ways and Means Committee of the House has been struggling with the whole tax problem for months, apparently without reaching conclusions. Assistant Secretary of the Treasury Roswell Magill, in private life a professor and theoretical tax expert at Columbia University, introduced a new revenue act which he frankly announced is only a springboard for a fundamental revision of all tax laws. This means, of course, that the Congress has not yet gotten down to the bedrock job of setting up a new tax structure, or of determining the ultimate amount of the appropriations that will be needed to carry on the nation's program.

It has been estimated that the grand total that will be exacted for 1938 by the Federal, State and local governments, will exceed fourteen billion dollars! This is an increase within two years of more than 30%. More than 20% of the estimated national income for this year.

Watch Deficiency Bills

When you read the daily reports about appropriations that have been made by the Congress, or that are on the brink of enactment, remember

that the final fiscal program will not be clear until the Congress comes to the very end of its session. The appropriations that tell the real story are the second and third *deficiency* bills which do not come before the Congress until late in April, or early in May, just before the Congress is ready to close up shop and go home.

Like the appropriations, it is mainly guesswork to attempt to forecast the nature of the tax-revisions. All we know for certain is that they will come later. Chairman Doughton has said so. It has also been suggested that business units of $25,000 and under will be made free of the undistributed profits tax, and, possibly, similar taxes. There is some likelihood that the undistributed profits tax may be washed out in connection with many other brackets considerably higher in the schedule. Business has been almost unanimous in requesting that this form of taxation be invalidated, and that the exaction be translated into an equivalent of income tax collection.

Corporations Not All Bad

There are also signs that the fight on so-called "closely held" corporations will be modified. The Congressional committee has become aware of the fact that there is a great difference between the corporation organized by a very few persons to avoid taxation, and the closely held little corporation which is pioneering progressively in some business and in some locality. Prof. Magill proposed sixty-three new methods of taxation in the bill he submitted to the committee on behalf of the Treasury, among which is the so-called Brandeis plan because it was sponsored by the aged Associate Justice of the Supreme Court in the Sunday afternoon chats he holds at his home with a number of eager young liberals. It provides a heavy tax on intercorporate dividends, a tax which would practically be confiscatory. The purpose is to force these accumulations of funds into the national Treasury so they may be sprayed about widely over the nation in enterprises involving mainly services.

Prof. Magill also hopes that Dr. Oliphant's—he is author of the undistributed profits tax plan—suggestion for a Board of Tax Appeals with infinitely wider powers, including a unique fiscal court, and a reversal of the present system by which the burden of proof is upon the Treasury, will be enacted by the Congress. If it is, the Board of Tax Appeals will become a quasi-judicial and administrative body like the FTC, the ICC, and the U. S. Tariff Commission, responsible directly to the President, rather than to the Congress. This tendency to delegate power to the White House is apparent in almost every new bill of similar purpose.

Monopolies and Trusts

Some time in February, if the legislative mill moves along reasonably, the President will send to the Congress a message requesting radical changes in the laws controlling and regulating monopolies, trusts and combinations. Despite what you may see in the news, the ultimate intention is to wipe out of existence every holding company. The final purpose is to make the Government of the United States the overall holding company. Patent laws are to be washed out, possibly abruptly or by degrees. The present idea is to shorten materially the term of years affording patent protection.

The President, also, is said to be insistent that the basing-point system be abolished. Some of his advisers are afraid that the abrupt change may cause anarchy in some branches of industry. The President, and others, also are convinced that the licensing of interstate corporations, with a Federal charter incorporating labor and trade practices, is fundamentally essential. They favor the O'Mahoney-Borah bill, but think it should be made more drastic.

FTC Expansion

Meanwhile, the Wheeler-Lea bill, already mentioned, which has passed both the House and the Senate, probably will be ready for the President's signature when this is published. This Act widely expands the powers of the Federal Trade Commission, giving it the right to prosecute industries that deceive the consumer. Heretofore its powers were limited to the regulation of competition between units of an industry or business. The new Act also will enable the FTC to enjoin an industry from doing something it assumes it may intend to do. Its power over advertising is enormously extended, making it virtually the censor of all spoken claims behind the counter, by traveling salesmen, over the air, in a letter, in a printed or mimeographed circular, and in newspapers and periodicals. The Act would enable the FTC to prevent the circulation of a publication carrying an advertisement enjoined by legal process.

Telephone Situation

The word is that the great fight against monopolies will begin with the FTC report about the A. T. & T. which is due any time. The FTC is expected to move to divorce the A. T. & T. and the Western Electric. And possibly to require the A. T. & T. to buy its supplies by competitive bidding. Also, it is said, long distance calls will be allocated to local exchanges. Among industries scheduled for monopoly investigation are those which include plumbing and heating equipment, and similar appliances and materials.

Michigan Short Course

The Eighth Annual Forced Warm Air Short Course will be held at Michigan State College, East Lansing, March 28, 29, 30, and 31. From the opening address by President Shaw on Monday at eleven o'clock to the sales sessions on Thursday, it will be packed with interesting and instructional meetings. Combustion, Soil Temperatures, Insulation, Air Movement, Controls, Filters, and Degree Day Estimating are some of the subjects promised by nationally known speakers.

The group will be divided into three parts depending upon whether they are beginners, or experienced designers of forced warm air plants or designers of cooling systems.

Ample rooms, reasonable meals, and nominal registration fee is promised.

Further information may be obtained by writing to Professor L. G. Miller, Mechanical Engineering Dept., Michigan State College, East Lansing, Mich.

Ohio

The 1938 Convention of the Ohio Sheet Metal Contractors Association will be held at the Deshler Wallick Hotel, Columbus, Ohio, March 29, 30 and 31.

Heading the Columbus Convention Committee are William Lauer, president of the Association, and A. E. Bogen, member of the Board of Directors. Messrs. Lauer and Bogen report that plans are being formed for a very attractive program, and Ohio contractors are urged to attend.

New York State

The program for the New York State Sheet Metal, Roofing & Air Conditioning Contractors' Association, Inc., annual convention to be held at Buffalo, New York, on March 7, 8 and 9, includes:

"Our President's Message".....H. J. Otten, Buffalo
"Welcome" .....Mayor Thomas Holling, Buffalo
"Built Up Roofing".....L. L. Williams, Bird & Son, Inc.
"Forced Air Heating Duct Design"..S. Konzo, University of Illinois
"Air Distribution" .....R. L. Leigh, Hart & Cooley
"Why Not Make a Profit?"..Edwin A. Scott, Sheet Metal Worker
"Licenses from California to Maine".....
.....J. D. Wilder, American Artisan
"Talking Steel Manufacturing Picture".....American Rolling Mill
"Business Prospects for 1938".....
.....H. T. Richardson, Richardson & Boynton Co.
"Bookkeeping and Cost Accounting for the Jobbing and Medium Size Shops"....Fred U. Ritter, Secy. Philadelphia Association
"Legislation on Business".....H. A. Daniel
"What's Ahead in Building for 1938".....
.....Thomas S. Holden, F. W. Dodge Corp.
"Visit the Bethlehem Steel New Rolling Mill at Lackawanna, N. Y."
"Romance and Development of Copper".....
.....Alden Merrill, American Brass Co.
"Group Insurance".....Thomas G. Gorman, State Insurance Fund

There will be entertainment—boxing, wrestling and open house—on Tuesday evening and a banquet, entertainment and dancing on Wednesday evening.

Indiana Tries Convention Innovation

THE Indiana Sheet Metal & Warm Air Heating Contractors Association, always progressive, again demonstrated its willingness to try something new by staging its nineteenth annual convention on a Friday and Saturday—January 21 and 22—in South Bend, Indiana. Not content with holding its convention on a Saturday, the association also split away from its Travellers Auxilliary and held a convention at which business sessions were run morning, afternoon and night.

Carrying its desire to be progressive and up-to-date still further, the association devoted practically all of the first day and a considerable portion of the second day to talks and discussions of residential air conditioning. Not residential air conditioning particularly from the standpoint of engineering, but more from the standpoint of sales as related to engineering, accompanied by ways and means and suggestions from the floor on how the warm air heating and sheet metal contractor could get a larger share of this growing market.

1938 Prospects

J. D. Wilder, Editor of American Artisan, asked to survey briefly conditions which might effect business during 1938, pointed out that Federal legislation, particularly FHA which will permit a prospective home builder to borrow up to 90 per cent of the total cost of his house should greatly stimulate home construction providing banks, mortgage institutions and building and loan association see fit to cooperate with this program. Surveys made during the latter part of 1937 showed that furnace production and sales for 1937 probably averaged between ten and fifteen per cent increase over 1936, which in turn was one of the best furnace sales periods of the last seven or eight years. Similar surveys showed that residential air conditioning in practically all centers of population is now an accepted part of house construction.

The home owner's desire for more modern kitchens, bathrooms, recreation rooms, etc., is tending to increase the per cubic foot price of houses until in some parts of the country the price is now almost level with 1927 and 1928, which was the boom period in residential construction. This increasing price of materials and labor and the desire for more modern equipment may tend to retard house construction unless the co-operating effort of the building industry, backed up by Federal and State and local political bodies can stimulate a great desire for the ownership of a home. That there is an acute shortage of places to live in many of the large cities has been proven many times during 1937 by surveys. From all indications there may be some slowing up in business durng the first part of 1938, but this should be followed by a greatly stimulated construction period and during the summer there will undoubtedly be another great increase in summer air conditioning. All in all, 1938 looks as though it would be a very excellent year for the warm air heating and sheet metal contracting trades.

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Air Conditioning

Prof. Lorin G. Miller, of Michigan State College, was unable to attend the convention, so Bruce F. McLouth, Dail Steel Products, presented Professor Miller's and his own discussions.

Speaking for Prof. Miller, Mr. McLouth outlined some of the basic physics of warm air heating and residential air conditioning, and then proceeded to trace briefly a history of warm air heating from the early days of the Roman baths heated by open fires in the basement through the Ben Franklin stove, the fireplace, the wood-burning and coal-burning stoves, up through the pipeless furnace area, then through the piped furnace area down through the present residential air conditioning system.

Mr. McLouth supplemented this brief historical resume with the importance of the Research Residence built in 1918, the introduction of the Standard Code for gravity heating in 1922, the first Mechanical Code in 1932, the additions in 1934 up to the new Technical Code of 1936.

Mr. McLouth made the interesting assertion that large corporations (interested primarily in items such as automobiles, refrigerators, foresaw in residential air conditioning a tremendous market some four or five years ago and brought out modernized equipment backed by enormous expenditures in engineering research. That generally speaking ignorance of the practical aspects of residential air conditioning has resulted in much advertising and sell-

ing conversation impractical to secure and impossible of guarantee. That within the past six months this situation has shown a direct reversal. Many manufacturers now realize that the installed system must be properly engineered and properly fabricated if the buyer is to obtain the results which the advertiser in sales conversation led him to expect.

Mr. McLouth pointed out that one of the mean problems of the past two or three years has been the prevalence of basing estimates on a per-opening basis. That prices of 10, 15, 20 dollars per opening which have been quoted cannot show a profit. Where wages are reasonable, or in other words, below $1.00 per hour quotations of $25 per opening can show some profit.

Engineering a Sales Aid

Mr. McLouth declared that in his estimation one of the most important contributing factors to better success in the engineering of residential heating systems is the new Technical Code and explained briefly some of the provisions of the code which contributes better engineering and more satisfactory results such as the basing of the cfm upon a certain number of air changes regardless of whether the house is insulated or uninsulated; permitting the register air temperature to come as it may according to the desired number of air changes; taking into consideration temperature drop in ducts; the establishing of actual register temperatures room by room and the correct cfm; the establishing of the actual resistance of the pipes of the system and the sizing of these pipes so that each run will carry its precalculated number of cubic feet of air per minute.

Speaking on the general subject of selling air conditioning, Mr. McLouth declared that many of the advocated methods of merchandising can not be applied because residential air conditioning is not a package product, but must be engineered for each job. That owners generally are more particular about changes in temperature, floor drafts, temperature differentials between floor and breathing level, higher and more uniform relative humidity within permissible limits, filtering, air circulation and the other things found only in warm air air-conditioning. Mr. McLouth expressed the opinion that one of the easiest ways to convince home owners that warm air, air-conditioning does offer these comfort and health qualities is to provide as a sales tool a complete, engineered plan of the system so that the home owner may be convinced that the contractor has actually given thought to the conditions faced and to the desires of the owner.

Association's Value

Frank Ederle, secretary of the Michigan association, declared that association membership pays if for no other reason than that it makes possible an exchange of ideas. Mr. Ederle declared that much of the condemned social activity overlooks the fact that this is definitely a part of any gathering and (within reason) should be encouraged. Auxiliaries should be encouraged to take part in association meetings and to assist contractors in getting new members and maintaining present membership.

That the automobile industry was commonly held to have taken us out of the last depression and that today the building industry is being looked to to lead us out of the present recession. That much of the criticism of building costs being too high is not based upon facts, as a house built today costs only eighty per cent of what it did at the peak of prices in 1924 and 1925.

In connection with the use of better materials, Mr. Ederle appealed to his listeners to condemn the use of second sheets, as in his opinion the trend to the use of seconds is increasing and contractors may find the situation working against them as the materials are subjected to weathering. He pointed out how the Michigan standards of weight of sheet and weight of coating have greatly assisted in maintaining material quality in Michigan and suggested that other states adopt a similar standard, which Michigan would gladly give permission to use.

Quick Estimating

Speaking on the subject of quick methods of estimating, J. A. Harris, president of the Indiana association, explained his method of sizing the heater and blower and arriving at a quick overall Btu heat loss. As a quick means of sizing ducts, Mr. Harris suggested taking the cubic contents of the room and dividing this by 25 which gives the square inches of branch or stack area. To the prices of equipment and the number of pounds of metal work should be added the profit and the cost of labor and materials to arrive at the ultimate selling price. While experience teaches that small pipes and stacks are often desirable, most contractors finally arrive at some minimum sizes below which they do not go.

Mr. Harris declared that too little attention has been given to the so-called "multiple pipe" job, in which individual round pipe, either tin or galvanized iron is used in place of complicated rectangular duct work, and from his records declared that rectangular duct work in small residences very frequently exceed fifty cents per pound—without any profit. Mr. Harris also pointed out that at the present time in many communities there is a price preferential for steam and hot water systems whereas the price preferential should be in favor of warm air air-conditioning. As a rough basis for estimating of the cost of labor Mr. Harris suggested that one mechanic and helper could fabricate and install 150 pounds of rectangular duct work in one eight-hour day providing there were not more than two or three fittings.

Short Cuts in Ventilation

"Short Cuts in Ventilation" was the subject of a brief talk by Paul R. Jordan, Indianapolis, in which he pointed out that small ventilating jobs sell for more generally than do similar sized heating jobs,

(*Continued on page* 98)

The Bin Method of Drying Seed Corn* [Part 2]

By A. H. Wright and F. W. Duffee
Departments of Agronomy and Agricultural Engineering

IF there is any one unit of the drier more important than the others, it is the fan. Make-shift fans or those designed for other purposes than drying should not be considered. Second hand fans, if of the proper type and size may be used, but a second hand fan that is not of the correct size and type is useless. The exact type and size of fan needed should be obtained regardless of whether it is new or second hand.

The only kind of fan suitable for bin drying is the multivane, blower type. This fan is constructed for blowing air under conditions where there is considerable resistance to the flow of air. The multivane type blower is a standard product, produced by a number of responsible companies.

Fans are made in many styles to suit various requirements. Some have a bottom horizontal discharge, others a top horizontal discharge, and still others a vertical discharge. They are also described as clockwise or counter-clockwise. In ordering a fan, these details must be considered and a correct description of the style stated.

In most bin driers, a fan with a top horizontal discharge is used. Whether it should be clockwise or counter clockwise depends on the side of the fan to which the pulley is attached. To decide this, one may assume that he is standing at the back of the fan, that is, at the end opposite the outlet. If when in this position, the pulley is desired on the left hand, then a counter clockwise fan is necessary; if the pulley is to be on the right side, then a clockwise style is needed. Probably the surest way is to furnish to the fan company a sketch of the exact set up and desired arrangement of the fan. The company manufacturing the fan will then know the style that is required.

Reprint of a leaflet of the same name, published by the Extension Service of the College of Agriculture, University of Wisconsin, Madison. Complete copies are available at a price of five cents.

Size, Speed and Horsepower

Fairly accurate information is now available as to the size of fan needed for a drier of any given capacity. Experience indicates that to obtain economically rapid drying, the air when entering the bins should have a velocity of approximately 70 feet a minute. Also, that the static pressure developed by the resistance of the air passing through the corn is about one inch. From these data the volume of air in cubic feet a minute required for any given drier can be calculated. When the static pressure and the volume in cubic feet a minute is known, the size, speed and horse power of the fan can be readily determined from tables provided by all well known fan manufacturers.

To illustrate, assume that the drier to be built consists of six bins each four feet wide and five feet deep. Such a drier will have 120 square feet of floor area. This 120 square feet multiplied by 70, which is the required rate of air flow, gives the desired air volume or approximately 9,000 cubic feet a minute. (Table II). Tables of specifications which will be supplied by any fan manufacturer, show the size, speed and horse power of the fan necessary to deliver 9,000 cubic feet of air a minute at one inch static pressure.

This quantity of air can be delivered by a small fan operating at a fairly high speed or a large fan at a slow speed. Extremes either way should be avoided. The small fan operating at high speed will be uneconomical of power, and the large fan at slow speed will require a higher investment. A size of fan that can be operated at a medium speed to give the desired volume and pressure is recommended. Manufacturer's tables should be used for determining size of fan.

The Heating Unit

While steam coils or stoves may be used, yet the

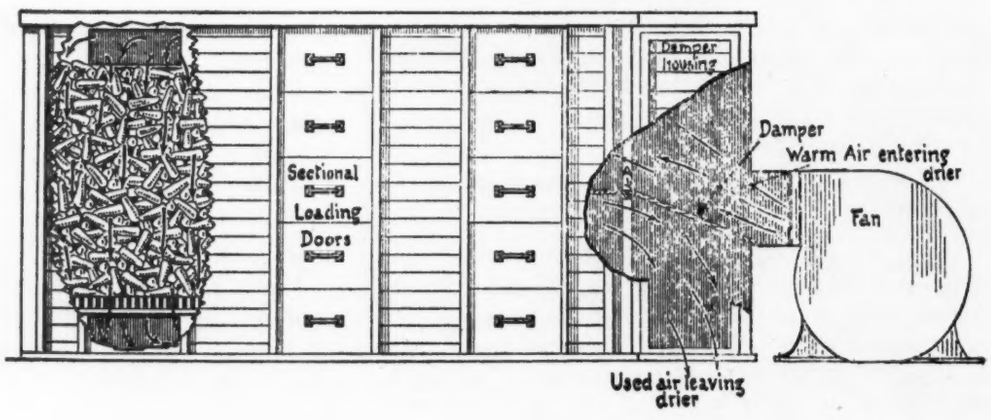


Fig. 4—Side view showing loading doors and the damper which directs heated air to top or bottom of bins according to setting.

most satisfactory type of heater for a corn drier is a warm air furnace.

Any dependable make of warm air furnace may be used. The common round or residence type is suitable for driers which have a capacity of less than 10,000 bushels. For driers of 10,000 bushels or more the horizontal type of furnace commonly used in school houses and churches is preferable.

The pipeless furnace is preferable if a round type is used because only one outlet is necessary in drying

TABLE II

Capacity of fan in cubic feet of air a minute for driers of various sizes. Reckoned at one inch static pressure.

Number of bins	Size of Bins Width feet	Depth feet	Total cross sectional area of bins	Required fan capacity in Cfm.
2	4	5	40	3,000
4	4	5	80	6,000
8	4	5	120	12,000
10	5	6	300	20,000
14	5	6	540	30,000
20	5	6	720	40,000
18	6	8	960	60,000

seed corn. The cold air intake may be either at the bottom or at the top of the furnace. Each arrangement is used and each is satisfactory. All depends on which type best fits the general arrangement of the entire drying plant. The furnace proper should be well housed and should have no baffles or other obstructions between the housing and the furnace walls. The cold air intake should be of ample area and should be at least 10 per cent greater than the outlet. This is to avoid throttling the air which is drawn in through the furnace.

The furnace wall should be carefully examined at the beginning of each season's operation, and all cracks should be completely closed. This is particularly important when a second hand furnace is used.

Size of Furnace

It is much better that the furnace be too large than too small. The rate at which the corn can be dried depends on the supply of heated air. An undersized furnace will slow down the entire drying operation.

The size of a round furnace is described in terms of the diameter of the fire box expressed in inches. From experience gained by using commercial bin driers, the furnace requirement for driers of various capacities have been approximately determined. More experience is necessary before the furnace requirements can be accurately calculated, but the approximate requirements given in Table III may be considered as reasonably accurate.

Power Equipment

The electric motor is decidedly preferable for operating a seed corn drier. Where electric power is not obtainable, gas or steam engines may be satisfactorily used. Experience indicates that a tractor is more dependable for running a fan than common types of stationary gas engines.

TABLE III.

Size of residence type of hot air furnaces and number of such furnaces needed for driers of various capacities.

Number of bins	Size of bins in feet Width	Depth	Height	Furnace Requirement Number of Furnaces	Diameter of fire box in inches
2	4	5	9	1	21
4	4	5	9	1	27
8	4	5	9	1	30
10	5	6	9	2	30
14	5	6	9	3	30
20	5	6	9	4	30
18	6	8	9	6	30

When motors are used, the best plan is to have a separate motor for operating each machine. In a corn drier, the machines requiring power are the fan, sheller and grader. While the approximate horse power needed for operating various sized fans is given in Table IV, yet the horse power required will vary considerably with the size and speed of the fan.

Buildings for Housing the Drier

Each of the bin driers in Wisconsin is completely housed. In most cases the bins, fan, furnaces, and other equipment are all in one building. Some have the fan and furnace in the basement. Others have all equipment on the same floor. Since so many variations in arrangement of corn drying plants are possible, no attempt will be made here either to describe or illustrate

TABLE IV.

Approximate horse power for operating fans of various capacities.

Capacity of drier in bu. of dry shelled corn	Fan capacity in cfm and 1" static pressure	Approximate HP to operate fan
500	3,000	2
1,000	6,000	3
2,000	12,000	5
4,000	20,000	9
6,000	30,000	12
8,000	40,000	15
10,000	60,000	20

the various arrangements, but the following general suggestions will apply to any arrangement:

1. Plan the arrangement of the drier so that all space will be as fully utilized as possible.
2. So arrange the drier that loading and unloading of bins can be done conveniently.
3. Avoid any arrangement that makes re-handling of the corn necessary.
4. Before building a drier every detail should be so planned that a maximum of convenience will be obtained and a minimum of labor for operation be required.

Operation of a Bin Drier

While the bin drier is simple to operate, yet atten-

tion to certain details is important. These details include: (1) proper firing of the furnace; (2) maintaining constant and correct temperature of the air; (3) proper mixing of the re-circulated air; (4) systematic regulation of the dampers in alternating the direction of the air through the corn in the bins.

In handling the furnace provide good draft. Be sure that the chimney is of sufficient height and proper size. Without proper draft no furnace will operate satisfactorily. Be sure the smoke pipe has an upward slope from the furnace to the chimney.

Fuel is one of the chief items of expense in operating a drier. Careless firing will materially increase the cost of operation. The one who does the firing should thoroughly inform himself as to how to fire a furnace. Dependable information is furnished by every furnace manufacturer and should be utilized.

Coal is usually the most satisfactory fuel although cobs are successfully used in some driers in the state. They require more constant attention and more frequent firing.

It is very important that a reasonably even temperature be maintained. A temperature of 100° to 110° F. will not harm seed corn either in quality or in appearance. The more constant the temperature at 100° F. the more rapid and satisfactory will be the drying. Widely fluctuating temperatures should be avoided. The rate of drying decreases rapidly as the temperature drops. On the other hand the temperature should not be allowed to go above 110° F.

To help in keeping a proper and uniform temperature a thermometer should be placed in the outlet from the furnace. This should be firmly supported and so placed that it can be read easily both at night and in the day time. Another thermometer should be placed at the end of the alley between the bins. This thermometer should be so arranged that it will not be damaged or broken. High grade thermometers should be used.

Re-circulating the Air

The heated air after passing through the bins should be returned to the furnace for reheating. If the air is blown through the furnace by the fan, then the used air from the bins should be returned to the fan. If the heated air is drawn out of the furnace, then the used air should be returned to the furnace. In no case should the return chute be completely housed directly to the intake of the furnace or the fan. The better plan is to allow the used air to flow out into the room near the fan or the furnace. This is necessary because at least 25 per cent of the air to be heated will be fresh air from the outside. The necessary fresh air can be provided by leaving open sufficient windows or doors in the room where the furnace or fan is located. Instruments for regulating the humidity of the air are not necessary. By frequently observing whether or not there is any condensation on the windows, the moisture of the air can be approximately determined. When a proper mixture is being used, there will be no condensation. If condensation occurs, more fresh air should be taken in from the outside.

Since it is important that the direction of the air through the corn in each bin should be changed at regular intervals to insure even drying, it is important that a definite system of regulation be used. The best plan is to change the dampers twice each day. In the morning the dampers should be set so that the air enters the bottom of each bin, flows up through the corn and out at the top; at night the dampers should be set so that the air will flow in at the top down through the corn and out at the bottom. By having a regular time for changing the dampers, uncertainty is overcome and regular alternation of air is obtained.

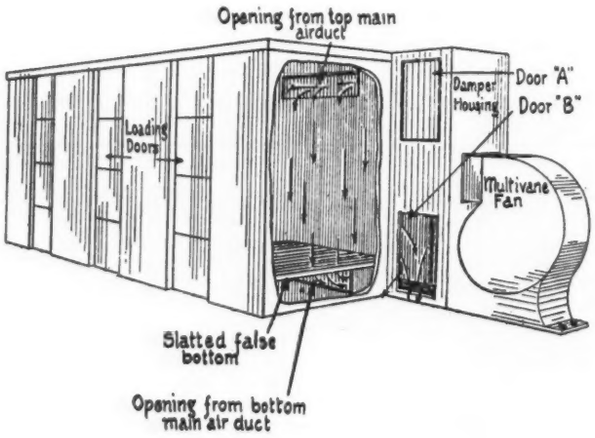


Fig. 1 — General arrangement of equipment for drying seed corn. Air heated in a furnace is blown into the top of the bins and pulled through the corn back to the blower. About 50 to 75 per cent recirculation.

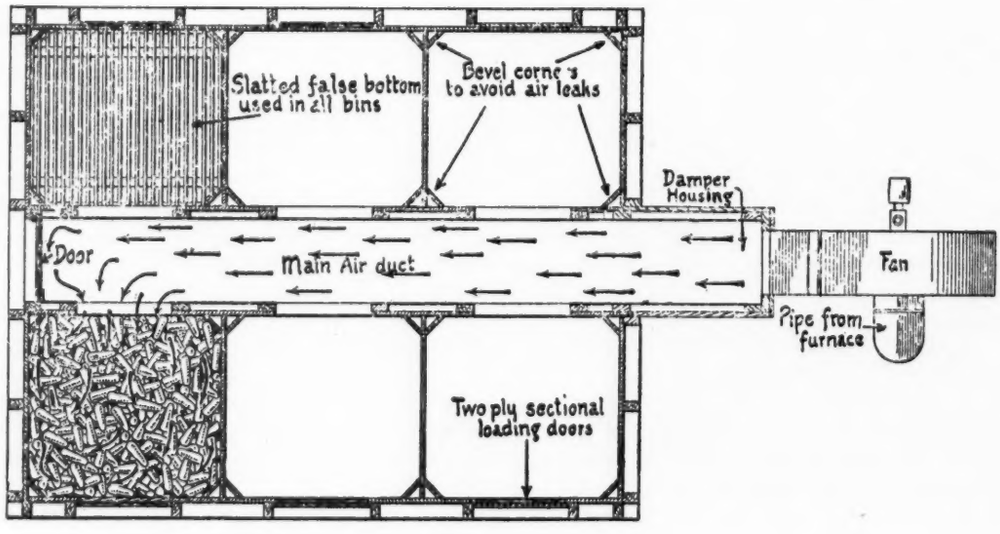
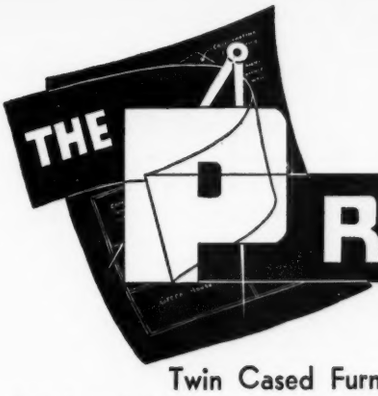


Fig. 2 — Floor plan of bin arrangement showing two rows of bins with the central warm air supply duct.



Your comment or experience is invited.

PROBLEM CORNER

Twin Cased Furnaces

American Artisan:

In a large church building or similar structure where the B.t.u. loss is greater than could be delivered by one large furnace, it has been the practice of the writer to enclose two such furnaces in one large casing with a correspondingly large plenum chamber. In several installations of this type, it has been found to be very satisfactory. However, I have just been told that enclosing two furnaces under one casing, using one fan, materially cuts down the B.t.u. output of either or both of the furnaces. In other words, it is argued that two 30-inch furnaces delivering over 200,000 B.t.u. each, if placed in one casing, won't deliver 400,000 B.t.u.

Would you please give me any possible reason why the capacity of furnaces lessened when twin cased?

Reply by S. Konzo:

If two warm air furnaces, each delivering 200,000 B.t.u. per hour, were enclosed in one single casing, the total delivery would be 400,000, provided that:

1. The total air delivered to the two furnaces is the sum of the air deliveries required for each furnace. If, for example, each furnace requires 2,500 cfm., the fan to be used for the single jacket installation should be 5,000 cfm. The use of two fans, each capable of handling the single casing, may or may not produce the required total delivery when arranged parallel as in this case. If the total circulation is for any reason less than the sum of the individual circulations, then the full capacity will not be developed.

2. The air circulation is uniformly divided between the two furnaces. If one furnace gets more air than the other, the full capacity may not be developed. The use of an inner partition wall between the two furnaces may help to prevent the air going entirely to one side of the casing.

3. The radiation from one furnace to the other is reduced to a minimum. The use of an inner partition will to a certain extent reduce this radiation.

In general, therefore, I would expect that unless precautions are taken, that the total delivery may fall slightly less than sum of the individual deliveries. The greatest difficulty is in providing a fan which will have a capacity twice as great as the single unit against a pressure loss in the casing which is materially different for that of the single casing.

Since we have not actually made tests under the conditions which you mention, the foregoing comments should be considered as purely personal opinions.

◆

Air Space Under Insulation

American Artisan:

Recently a local newspaper ran an item in which the claim was made that the efficiency of storm sash increases as the space between the sash and the window is reduced and best results are obtained when this space is ½ inch. I have always considered the action to be just the reverse—that within certain limits the wider the space, the greater the insulating value.

For example, I installed a ceiling in a four-family flat building with ½-inch blanket insulation. The ceiling has 6-inch joists. Instead of nailing the insulation between the joists against the ceiling below, I nailed the insulation on top of the joists (where the attic flooring should go) holding the strips of material onto the joists with pieces of lath. The insulation was tucked in well at the plates so there is no circulation between ceiling and insulation. I have, therefore, a 6-inch air space between the ceiling and the insulation and thought this was a better than usual method.

H. G. O., Michigan.

Reply by
The Editors

In reply to your letter on insulating values, without having any definite test data, we should say off hand that any type of fill insulations or blanket insulations, will give the best efficiencies when laid direct on the warm surfaces such as the ceiling. These insulations depend for insulating value upon minute air spaces trapped within the material or simply as air spaces between particles of the material.

With respect to the first part of your letter regarding storm sash and double glazed windows, we enclose tear sheets of an article from Heating, Piping & Air Conditioning, which contained charts showing the inside surface temperatures of glass for single and double glazed windows, and single windows with storm sash for different spaces between the glass. These two charts indicate that inside surface temperatures more nearly reach room temperatures for double glazed intermediate casements than for single glass double hung windows, and that the temperature goes up very slightly as the air space is widened.

There must be a maximum space permissible since too wide a spacing permits air circulation within the space and thus defeats the purpose intended.

◆

American Artisan:

Your editorial "Codes Need Education" is quite to the point and shows one weakness of human nature.

We all like to depend on somebody or something to help us, instead of getting out and helping ourselves.

Codes in any industry are only as good as the enforcement.

The same amount of active, organized interest in the activities of our trades required to properly enforce codes would accomplish a great deal of good without the codes.

When the people in each of the different branches of the sheet metal, roofing and air conditioning industry are willing to give more attention to selling quality, durability and value and in delivering these things to the customer, and less attention to chiseling off their prices, there will be less complaint about inability to secure profits.

Manufacturers of the various goods we use set prices from which they can secure profits. The people from whom a large part of the industry buy labor work together and establish wage scales and working rules which they enforce to the extent of their ability in organized communities. Property owners, either directly or through architects and contractors, have become experts at getting low prices.

Most of the evils which are inflicted by the abuses of these three different units in the building industry could be wiped out if one-fourth of the sheet metal, roofing and air conditioning contractors would get together and stick together and work for a fair deal for the industry.

If **one-half** the sheet metal, roofing and air conditioning contractors would get together and stick together they could wipe out **all** of the abuses.

When we as an industry have sense enough to co-operate we will not need to complain about the chiseling tactics of contractors or unfair discriminations of manufacturers or the competition of mail order houses or the obstructive working rules which some of the unions enforce. We can then figure jobs with the expectation of **getting profits** instead of only the satisfaction of beating a competitor.

H. A. DANIEL, President,
Atlas Roofing Company, The "Quality Roofers."

The Fort Wayne Licensing Ordinance

Our publication of the Fort Wayne ordinance is nearing the end. This ordinance, like that of Minneapolis, is unusually complete and leaves little to guesswork, either for contractor or inspector. Readers wanting printed copies should write us.

Oil Burner Installation

Section 47-a. Approval of Oil Burners: It shall be unlawful for any person, firm, corporation, or their agents, to install any oil burner until an application for approval of such make or type of burner, on a form such as set forth immediately hereafter, shall have been filed with the Building Department and a "Certificate of Approval" of such burner issued by said Inspector. Said Inspector shall issue a Certificate of Approval or of Disapproval within thirty (30) days after the filing of any such application.

Application for Certificate of Approval

The undersigned hereby requests that a Certificate of Approval be issued for the oil burner described below:

1. Name of Burner .....
2. Name of Manufacturer .....
3. Address of Manufacturer.....
4. Kind of Fuel recommended for Burner .....
5. Length of time Burner has been on Market .....
6. List approvals by States, Cities or recognized Laboratories:

Name ..... Date .....

.....

.....

7. Attach blueprint of assembly drawing showing construction of device, indicating moving parts, oil passages and air passages. Application filed by .....

.....

At Fort Wayne, Indiana, this.....day of....., 19....

Section 47b. The Inspector shall approve any oil burner listed by the Underwriters Laboratory or any other nationally recognized inspection board or laboratory. Oil burners not listed by the Underwriters Laboratory or any other nationally recognized board or laboratory shall not be approved until they have been inspected and tested by the Inspector. This inspection and test shall cover arrangements of parts, suitability of material, strength of parts, electrical control, thermostatic arrangement, reliability of automatic features, positiveness of ignition and safeguards against flooding. In case the Inspector does not feel that he is competent to make the above inspection and test, he is hereby authorized to require that the applicant submit a report of such an inspection and test from a recognized laboratory.

c. With a Certificate of Disapproval the Inspector shall issue to the applicant and to the manufacturer of the device a clear and concise statement as to the reason or reasons for disapproval.

d. (a) New application made after the issuance of a Certificate of Disapproval shall not be made until thirty (30) days from date of issue of said certificate.

(b) New application shall be accompanied by a clear and concise statement giving reasons for reconsideration based on information received with Certificate of Disapproval.

(c) The Inspector shall act on new application as specified in Section 47a and Sub-Sections 47b and 47c.

e. When making an application to the inspector for a Certificate of Approval such as above provided for, or a re-application for such a certificate after a previous issuance of a Certificate of Disapproval of the same make or type of burner, the applicant shall be required to pay to the Inspector of Buildings, in connection with each such application or re-application, a filing fee in the sum of Fifteen Dollars ($15.00). All such fees so collected under this ordinance shall be paid over to the City Controller, by the Inspector, as soon after collection as practicable.

Section 48. Installation of Used Oil Burners, Procedure Required: Any person licensed to install, alter, repair and service oil burners in the City of Fort Wayne shall install a used burner for use in connection with a heating system only after he shall have furnished the Inspector of said city with a statement that said oil burner has been put in first class operating condition, a letter from the purchaser acknowledging that said purchaser is buying a used oil burner, and a certificate from two (2) competent engineers, whose qualifications have been recognized by the Inspector, that said engineers have inspected and approved said used burner.

Section 49-a. Fuel oil: The grade of fuel oil used with any burner shall be one which tests and experience have shown to be suitable for use with that burner. The oil shall have a flash point not less than 100 degrees Fahrenheit, determined as specified in Section 1 paragraph e, and shall be free from acid, grit and fibrous or other foreign matter likely to clog or injure the burners or valves.

b. Commercial Standards: The comercial standards (grades 1, 2, 3, 4, 5 and 6) for domestic and industrial fuel oils, set up by the U. S. Federal Government, Department of Commerce, Bureau of Standards Bulletin CS 12-29 (issued November 7, 1929) shall constitute standard grades for fuel oil sold or delivered to oil burner plants within the city of Fort Wayne, and it is hereby declared a violation of this ordinance for any person, firm or corporation to deliver or put into the storage tank of an oil burner plant a grade of oil inferior to that ordered by the purchaser.

Section 50. Use of Non-Automatic Burners Limited: Oil burners which are not equipped with automatic means for preventing abnormal discharge of oil at the burner, shall not be installed or operated in any location where a competent attendant will not be constantly on duty in the room where the burner is located while the burner is in operation.

Section 51-a. Gravity Feed to Burners. Gravity feed shall be used only with burners arranged to prevent abnormal discharge of oil at the burner by automatic means specifically approved for the burner with which it is used.

b. Gravity supply tanks shall not exceed 275 gallons individual capacity. Where more than one gravity supply tank is used, such tanks shall be connected to the feed pipe leading to the burner through a manually operated, approved three-way valve in such a way that only one tank can discharge its contents at a time.

c. Where oil is supplied to the burner by gravity and a constant level device is not incorporated in the burner assembly or in an auxiliary tank used in connection with an automatic pump, an approved constant level device shall be installed in the oil feed line at the gravity tank or as close thereto as practicable. The vent opening of such constant level device shall be connected by piping or tubing to the gravity tank vent pipe.

Section 52. Pressure Tank Feed shall be used only with burners arranged to prevent abnormal discharge of oil at the burner by automatic means specifically approved for the burner with which it is used.

Pressure tanks shall not exceed a capacity of 60 gallons, and shall not be operated at pressures exceeding 50 pounds per square inch. They shall be equipped with a reliable pressure gauge, and with an automatic relief valve piped to discharge outside of buildings.

Section 53-a. Installation of Underground Tanks: Underground tanks shall be so buried as to have a cover of earth not less than 2 feet thick, or shall be covered with not less than 1 foot of earth on top of which shall be placed a slab of reinforced concrete not less than 4 inches thick. The slab shall be set on a firm, well tamped earth foundation and shall extend at least 1 foot beyond the tank in all directions. Where tanks are buried underneath buildings such a concrete slab shall be provided in every instance.

b. Underground tanks shall be set on a firm foundation and surrounded with soft earth or sand well tamped in place. Where necessary to prevent floating they shall be securely anchored or weighted.

Section 54-a Installation of Tanks Inside Buildings: Oil supply tanks larger than 60 gallons capacity shall not be located in buildings above the lowest story, cellar or basement.

b. Unenclosed inside storage tanks and auxiliary tanks shall not be located within 5 feet horizontally, of any fire or flame.

c. Inside storage and auxiliary tanks shall be securely supported by substantial incombustible supports to prevent settling or sliding.

d. Oil supply tanks located inside buildings shall not exceed 275 gallons individual capacity or 550 gallons aggregate capacity (in one building) unless installed in an enclosure or casing constructed as follows:

The walls of the enclosure shall be constructed of reinforced concrete at least 6 inches thick or of brick at least 8 inches thick, and shall be bonded to the floor. The space between the tank and the enclosure shall be completely filled with sand or well tamped earth. Where the floor or other construction immediately above the tank is of fire-resistive construction capable of safely sustaining a load of 150 pounds per square foot, the walls of the enclosure shall be carried to a height not less than 1 foot above the tank and the space filled with sand or well tamped earth to the top; otherwise the enclosure shall have a top of reinforced concrete at least 5 inches thick or of equivalent construction.

Instead of an enclosure as above described the tank may be encased in reinforced concrete not less than 6 inches in thickness, applied directly to the tank so as to completely eliminate any air space.

e. In buildings of ordinary construction the nominal gross capacity of tanks shall not exceed 5,000 gallons.

f. In fire-resistive buildings the nominal gross capacity of tanks shall not exceed 15,000 gallons.

g. In any building, if in a fire-resistive or detached room cut off vertically and horizontally, in an approved manner, from other floors of the main building, the nominal gross capacity of tanks shall not exceed 50,000 gallons, with an individual tank capacity not exceeding 25,000 gallons.

Section 55-a. Construction of Tanks: Underground tanks and tanks inside buildings shall be constructed of steel or wrought iron of a minimum guage (U. S. Standard) in accordance with the following table, except that for tanks of 181 to 275 gallons capacity, installed in buildings, and without masonry enclosures the minimum gauge shall be No. 14. Steel or wrought iron thinner than No. 7 gauge used in the construction of underground and enclosed tanks shall be galvanized.

Capacity, Gals.	Thickness Minimum	per sq. ft. Weight Lbs.
7 to 285	16 gauge	2.50
286 to 560	14 gauge	3.125
561 to 1,100	12 gauge	4.375
1,101 to 4,000	7 gauge	7.50
4,001 to 12,000	¼ in. (nom)	10.00
12,001 to 20,000	5-16 in. (nom)	12.50
20,001 to 30,000	⅜ in. (nom)	15.00

If adequate internal bracing is provided, tanks of 12,001 to 30,000 gallons capacity may be built of ¼-inch plate. For tanks larger than 1,100 gallons capacity, a tolerance of 10 per cent in capacity is permitted.

b. Joints shall be riveted and calked, brazed, welded or made tight by some equally satisfactory process. Tanks shall be tight and sufficiently strong to bear without injury the most severe strains to which they may be subjected in practice. Shells of tanks shall be properly reinforced where connections are made. All connections to underground tanks and tanks inside buildings shall be made through the top of tank above the liquid level, except that tanks of not over 275 gallons capacity may have one bottom connection for gravity feed and one opening for an approved key stem gate valve to facilitate cleaning or for a scavenging line to be run to the outside and capped oil tight when not in use.

c. Pressure tanks shall be designed for at least six times the maximum working pressure.

d. Tanks shall be thoroughly coated on the outside with tar, asphaltum, or other suitable rust-resisting paint. Where placed in corrosive soil special protection may be required.

NOTE: Tanks labeled by Underwriters' Laboratories have been tested and examined for compliance with these regulations and detail standards covering their design and construction.

e. For fuel oil heavier than 35 degrees A. P. I., tanks may be made of concrete, in accordance with the Regulations of the National Board of Fire Underwriters for the Construction of Concrete Fuel Oil Storage Tanks as recommended by the National Fire Protective Association.

Vents

Section 56-a. Tank Vents: Storage tanks shall be equipped with an open vent or an approved automatically operated vent, arranged to discharge to the open air. Vent openings and vent pipes shall be of ample size to prevent abnormal pressure in the tank during fillings but not smaller than 1¼-inch pipe size.

b. Vent pipes shall be arranged to drain to the tank. The lower end of the vent pipe shall not extend through the top into the tank for a distance of more than one inch.

c. Vent pipes shall terminate outside of buildings at a point not less than 2 feet measured vertically or horizontally from any window or other building opening and not less than one (1) cubic foot above fill cap, nor less than two (2) feet above the ground. Outer ends of vent pipes shall be provided with a weatherproof hood. Vent pipes of tanks containing heaters shall be extended to such a height that oil vapors discharging from the vent will be readily diffused without danger of ignition.

d. Vent pipes shall not be cross-connected with fill pipes or return lines from burners.

Section 57-a. Tank fill and Overflow Pipes: Underground tanks and storage tanks inside buildings shall be filled only through fill pipes terminating outside of buildings at a point at least 2 feet from any building opening at the same or lower level. Fill terminals shall be closed

tight, when not in use, by a metal cover designed to prevent tampering.

b. Auxiliary tanks shall be filled by pumping from storage tanks.

c. Auxiliary tanks other than vacumn tanks shall be equipped with an overflow pipe draining to the storage tank, at least one size larger than the supply pipe.

d. Overflow pipes of auxiliary gravity tanks shall have no valves or obstructions. Overflow pipes of auxiliary pressure tanks shall be provided with inner-connected valves or other means for automatically venting the tank during filling.

Section 58-a. Oil Gauging: All tanks in which a constant oil level is not maintained by an automatic pump shall be equipped with an approved method of determining the oil level.

b. Test wells shall not be installed inside buildings and where permitted for outside services shall be closed tight when not in use by a metal cover designed to prevent tampering.

c. Gauging devices such as liquid level indicators or signals shall be installed so that oil or vapor will not be discharged into the building from the fuel supply system.

d. No glass gauge, or any gauge the breaking of which will permit oil to escape from the tank, shall be used.

Section 59-a. Oil Pumps: Oil pumps shall be of approved type, secure against leaks, and shall be rigidly fastened in place.

b. Automatic pumps not an integral part of the burner shall be arranged to stop automatically in case of total breakage of the supply line to the burner.

c. In isolated locations, where fire protection equipment is dependent upon a heating plant fired by an oil burner, oil pumps supplying the burner shall be installed in duplicate.

Section 60-a. Piping: All piping shall be standard full weight wrought iron, steel or brass pipe with standard fittings or approved brass or copper tubing with approved fittings, except that approved flexible metal hose may be used for reducing the effects of jarring and vibration or where rigid connections are impracticable.

b. Pipe used in the installation of domestic type burners shall not be smaller than ¼-inch iron pipe size; pipe used in the installation of industrial type burners shall not be smaller than ½-inch iron pipe size. Copper or brass tubing used in the installation of domestic type burners where the oil flows by gravity from the tank to the burners shall not be smaller in size than three-eights (⅜) inch outside diameter, forty-nine thousandths (.049) inch wall thickness tubing. For other than domestic installations such copper or brass tubing shall not be smaller than three-eights (⅜) inch inside diameter, forty-nine thousandths (.049) inch wall thickness tubing. For industrial type burners such copper or brass tubing shall not be smaller in size than the equivalent of the iron pipe size mentioned above, with wall thicknuess not less than forty-nine thousandths (.049) inch. Flexible metal hose shall be installed strictly in accordance with the limitations of its approval.

c. Piping shall be rigidly secured in place and protected from injury in a workmanlike manner, and where necessary, shall be protected against corrosion. Where practicable, oil piping shall be buried underground or in a concrete floor or placed in a metal-covered pipe trench.

d. Pipe joints and connections shall be made tight in a workmanlike manner. Unions and tubing fittings shall be of approved type. Unions requiring gaskets or packing, and right and left couplings, shall not be used in oil lines.

e. Proper allowance shall be made for expansion, contraction, jarring and vibration. Pipe lines, other than tubing, connected to underground tanks, except fill lines and test wells, shall be provided with double swing joints arranged to permit the tank to settle without impairing the efficiency of the pipe construction.

f. Oil supply lines to burners shall be provided with approved strainers.

Section 62. Preheating of oil, where necessary, shall be done by steam, hot water or approved electric heaters. Heaters shall be substantially constructed with all points made oil tight. Thermometers shall be installed at suitable locations to indicate the temperature of the heated oil. Heaters shall be by-passed or provided with suitable means to prevent abnormal pressure.

Section 61-a. Valves: Readily accessible shut-off valves of approved type shall be installed in oil supply lines near each burner and close to gravity and pressure supply tanks. Shut-off valves of approved type shall be installed on each side of oil strainers which are not a part of the oil burner unit and on the discharge and suction side of oil pumps which pump directly to the burner but which are not a part of the burner unit.

b. Where a shut-off valve is installed in the discharge line of an oil pump, an approved pressure relief valve shall be connected into the discharge line between the pump and the shut-off valve and arranged to return surplus oil to the storage tank or to by-pass it around the pump.

c. Control valves shall be provided with stuffing box of liberal size, containing a removable cupped gland designed to compress the packing against the valve stem and arranged so as to facilitate removal. Valves shall be designed to close against the supply, and to prevent withdrawal of stem by continued operation of the handwheel. Packing affected by the oil or by heat shall not be used.

Section 63. Tests of Covered Tanks and Piping. After installation and before being covered, tanks of 1,000 gallons capacity or more, and piping, shall be tested hydrostatically, or with equivalent air pressure, at a pressure not less than 1½ times the maximum working pressure, but not less than 5 pounds per square inch at the highest point of the system. Instead of a pressure test, suction lines may be tested under a vacuum of not less than 20 inches of mercury. Such tests shall be made by the installer, in the presence of the inspector, and shall continue for at least 30 minutes without a noticeable drop in pressure or vacuum.

Section 64-a. Oil Burner Controls: Oil burner equipments shall be provided with some means for manually stopping the flow of oil to the burner, from a conveniently located point at a safe distance from the burner. With electrically driven equipment this may be accomplished by a switch in the motor supply circuit, placed near the entrance to the room where the burner is located. A quick-closing valve in the oil supply line may also be used.

b. Automatically operated oil burners used in connection with warm air heating systems shall be equipped with approved automatic devices to shut down the burner in the event of undue overheating.

c. In systems where steam or air is used for atomizing the oil, the equipment shall be so arranged that in case of interruption of the atomizing supply the oil supply will be immediately shut off.

Section 65. Any repairing, maintenance or servicing of equipment installed under the provisions of this ordinance may be performed by the holder of any license granted hereunder.

Section 66-a. Installation of the Burner: Oil burners shall be securely installed in a workman like manner, in accordance with the instructions of the manufacturer, supervised by qualified mechanics, experienced in making such installations and licensed as required herein.

b. Where oil burners are installed in furnaces originally designed for solid fuel, the ash door of the furnace shall be removed or bottom ventilation otherwise provided to pre-

(*Continued on page* 74)

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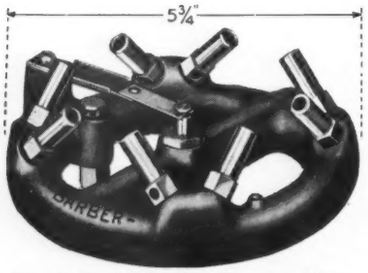
RESIDENTIAL AIR CONDITIONING SECTION

PLEASING, indeed, have been the comments on the idea behind G. A. Voorhees Precalculated Engineering which began in the January issue. Article 2 showing how the method should be applied appears in this issue. Also one additional table for walls with a coefficient of .35.

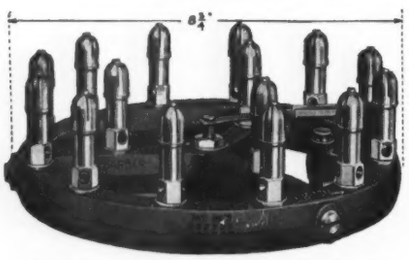
Errors so frequently creep into air flow determinations that it becomes necessary to understand exactly how to make air delivery tests. S. Konzo writes the first of two articles on this subject in this issue, reviewing test equipment construction and supplying charts to correct for air temperature and density.

And Professor L. G. Miller continues his discussion of humidity with an article showing how the body radiates heat and why radiation causes a feeling of discomfort even with proper room air temperatures. The part that relative humidity and vapor pressure play in this process make interesting reading.

WANTED—*Your* Problems on Gas Appliance Burners!



No. S. P.-15 Barber Burner Unit



No. C. P.-150 Barber Burner Unit

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● Write for illustrated Catalog and Price List on Conversion Burners for Furnaces and Boilers, Burner Units for Gas Appliances, and Gas Pressure Regulators.

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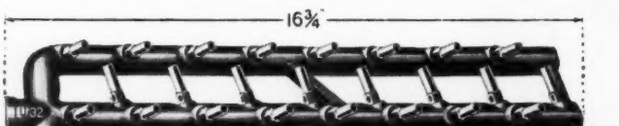
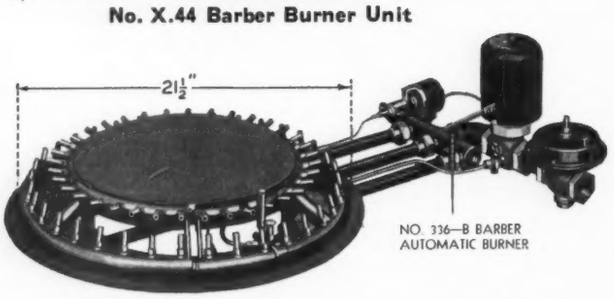


No. U-32 Barber Burner Unit



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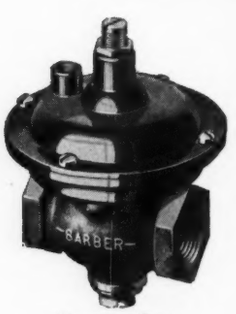

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BARBER *Automatic* JET GAS BURNERS

Precalculated Engineering

There is urgent need today for some form of engineering calculation which will reduce the time required to estimate heat loss, establish cfm, determine register air temperature and duct sizes and, at the same time, be accurate enough for the average job. The method suggested in Part I (January) is based upon exposed wall areas with all calculations worked out beforehand and permanently filed in the form of precalculated tables. This article is Part 2 and applies the method to an actual job.

By G. A. Voorhees
Consulting Engineer, Indianapolis

IN the first article of this series (January, 1938) it was pointed out that precalculated tables of heat losses of rooms offer two distinct advantages to the busy heating man:—

1. They save valuable time.
2. They help greatly to insure accuracy.

For the benefit of the many readers who dislike to use such tables unless they know how the tabular values are derived, much of the text of the preceding installment was devoted to an explanation of the methods of calculating the tables themselves, and very little additional space was available for a detailed explanation of their practical application.

An Installation Worked Out

The present article will therefore show, step by step, how to use three of the tables in determining the heat requirements of the rooms of a dwelling. For this purpose the small brick farm house (Fig. 1) has been chosen. This is an actual job submitted to the writer recently with a request for warm air leader sizes and furnace capacity required for gravity heating. The house previously had been heated by stoves and the owner stated that it had "always been a hard house to heat."

Although this series of articles will deal principally with forced air heating, the heat losses of rooms are the same whether warm air is delivered by natural gravity flow or by blower pressure. Hence the heat loss tables are just as applicable in figuring gravity-circulating furnace plants as they are for the design of forced air heating or winter air conditioning systems.

Structural data are as follows:

All outside walls except those of room 105, are 12-inch brick with plaster applied directly to the interior surface of the brick.

Room 105 (recently added to the house), has outside walls of frame construction consisting of yellow pine lap siding, paper, wood sheathing, studding, lath and plaster.

There is a basement under the entire house except room 105. (Foundation under outside walls of room 105 is tight and there is full opening from basement into unexcavated space under this room so its floor is not cold.)

The house, except for room 105, is full two-story, but the space above rooms 103 and 104 has never been floored or otherwise finished.

Two years ago mineral wool insulation was placed between the ceiling joists above the kitchen (room 104) because the oil stove used for cooking did not keep that room comfortably warm.

The windows and outside doors of the living room (room 101) are weatherstripped and the windows of room 201 have storm sash. All other windows and doors have neither weatherstrip nor storm sash.

The first step in determining the heat requirements of this, or any other building, is to *provide a systematic method of recording all data.* Slipshod methods of figuring and recording heat losses or

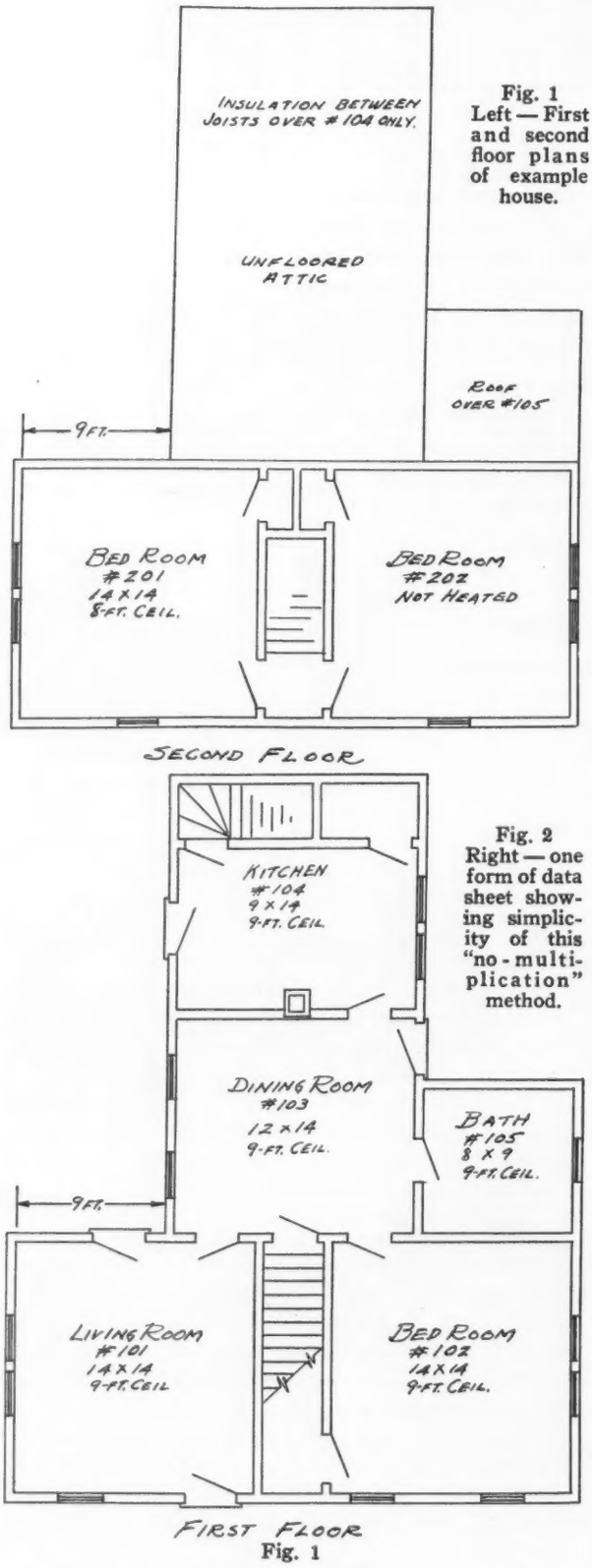

INSULATION BETWEEN JOISTS OVER #104 ONLY.
UNFLOORED ATTIC
ROOF OVER #105
9 FT.
BED ROOM #201 14X14 8-FT. CEIL.
BED ROOM #202 NOT HEATED
SECOND FLOOR
KITCHEN #104 9X14 9-FT. CEIL.
DINING ROOM #103 12X14 9-FT. CEIL.
BATH #105 8X9 9-FT. CEIL.
9 FT.
LIVING ROOM #101 14X14 9-FT. CEIL.
BED ROOM #102 14X14 9-FT. CEIL.
FIRST FLOOR

Fig. 1

Fig. 1 Left — First and second floor plans of example house.

Fig. 2 Right — one form of data sheet showing simplicity of this "no-multiplication" method.

Room 101	Dimensions 14X14			
Construction of exposed wall 12" BRICK + PLAST				
Table No. 5	Ceiling height 9			Heat loss
Running feet exposed wall 37				8.2
WINDOWS Type	Dimensions	No.	Equiv. No. of standard windows	
W	2½X5	3	3	4.3
Outside doors Type W		2	4	5.5
Cold ceiling none	Dimensions			
Cold floor none				
Heat loss for 70-degree temperature difference				18.3
Corresponding heat loss for Temp. Diff. of degrees				

Room 102	Dimensions 14X14			
Construction of exposed wall 12" BRICK + PLAST				
Table No. 5	Ceiling height 9			Heat loss
Running feet exposed wall 28				6.2
WINDOWS Type	Dimensions	No.	Equiv. No. of standard windows	
Pl	2½X5	4	4	7.0
Outside doors Type none				
Cold ceiling FLOOR ABOVE	Dimensions 14X14			4.3
Cold floor none				
Heat loss for 70-degree temperature difference				17.5
Corresponding heat loss for Temp. Diff. of degrees				

Room 103	Dimensions 12X14			
Construction of exposed wall 12" BRICK + PLAST				
Table No. 5	Ceiling height 9			Heat loss
Running feet exposed wall 16				3.5
WINDOWS Type	Dimensions	No.	Equiv. No. of standard windows	
Pl	2½X5	2	2	3.5
Outside doors Type Pl		1	2	3.5
Cold ceiling NO FLOOR ABOVE	Dimensions 12X14			3.7
Cold floor none				14.2
Heat loss for 70-degree temperature difference				
Corresponding heat loss for Temp. Diff. of degrees				

Room 104	Dimensions 9X14			
Construction of exposed wall 12" BRICK + PLAST.				
Table No. 5	Ceiling height 9			Heat loss
Running feet exposed wall 18				4.0
WINDOWS Type	Dimensions	No.	Equiv. No. of standard windows	
Pl	2½X5	2	2	3.5
Outside doors Type Pl		1	2	3.5
Cold ceiling INSULATED	Dimensions 9X14			0.6
Cold floor none				
Heat loss for 70-degree temperature difference				11.6
Corresponding heat loss for Temp. Diff. of degrees				

Room 105	Dimensions 8X9			
Construction of exposed wall Standard frame				
Table No. 3	Ceiling height 8			Heat loss
Running feet exposed wall 17				2.4
WINDOWS Type	Dimensions	No.	Equiv. No. of standard windows	
Pl	2½X5	1	1	1.8
Outside doors Type none				
Cold ceiling NO FLOOR ABOVE	Dimensions 8X9			1.6
Cold floor none				
Heat loss for 70-degree temperature difference				5.8
Corresponding heat loss for Temp. Diff. of 80 degrees				6.7

Room 201	Dimensions 14X14			
Construction of exposed wall 12" BRICK + PLAST				
Table No. 5	Ceiling height 8			Heat loss
Running feet exposed wall 37				7.3
WINDOWS Type	Dimensions	No.	Equiv. No. of standard windows	
Pl	2½X5	3	3	4.2
Outside doors Type none				
Cold ceiling NO FLOOR	Dimensions 14X14			4.3
	5X8			0.9
Cold floor none				
Heat loss for 70-degree temperature difference				16.7
Corresponding heat loss for Temp. Diff. of degrees				

Fig. 2

similar data have cost the heating industry thousands of dollars. It's easy—too easy—to jot down room dimensions and window sizes on the back of an old envelope and to make the subsequent heat loss calculations on whatever scrap of blank paper is available. And then a few days or weeks later, turn office and shop topsy turvy looking for "the figures on the Jones job."

The data sheet shown in Fig. 2 is one of several possible forms which might be used with these precalculated tables. It's not so important *what* form is used—but it's vitally important that *some* such form be adopted and used consistently. (Additional copies of this data sheet are available and may be obtained from the American Artisan.)

On the data sheet, rooms may be identified by name or number. If numbers are used, it is suggested that basement rooms be numbered 11, 12, 13,

etc.; first floor rooms, 101, 102, 103, etc.; second floor rooms, 201, 202, 203, etc. Thus, wherever a room number is encountered in succeeding tabulations, its number at once indicates the proper floor.

Starting with the living room (room 101) enter the number of the room in the upper left hand corner of the first section of the data sheet as shown on the specimen (Fig. 2). On the same line show the dimensions of the room. Since the outside wall construction is 12-inch brick with plaster, indicate that in the space provided in the second line.

For this type of wall construction use Table No. 5, page 48. It will be noted that this 12-inch brick and plaster is listed as wall type No. 24 in Table 5 and while its heat transmission coefficient is 0.34 instead of 0.35 the difference is so slight as to be negligible.

The ceiling height is 9 feet and is so recorded on the data sheet.

Since the room (as shown by the plan) is 14 feet square and has two full sides exposed with 9 additional feet of exposure on the third side, the total number of running feet of exposed wall is 14+14+9=37 feet which is entered on the fourth line of the data sheet. Referring now to Table No. 5 it is found that for 37 running feet of this type of wall with 9-foot ceiling, the heat loss through the wall is 8.2 (which means 8,200 Btu per hour). Enter this value (8.2) in the "Heat Loss" column opposite "Running Feet of Exposed Wall."

How Windows Are Calculated

As stated in the text previously, the windows of this room are weatherstripped and this fact should be noted under the heading of "Window Type." The following abbreviations are used here and are suggested for general use in identifying the various types of windows and outside doors:

Pl for plain windows or doors which have neither weatherstrips nor storm sash or storm doors.

W for windows or doors which have weatherstrip only; no storm sash or storm doors.

S for windows having storm sash or doors protected by storm doors—but having no weatherstrip.

SW for windows protected by both storm sash and weatherstrip and for doors having both storm doors and weatherstrip.

Following this procedure the window type for room 101 is indicated as "W" in the space provided on the data sheet. For convenience all windows will be assumed to be 2-ft. 6-ins. wide by 5-ft. high and will be so entered in the space for recording window dimensions. In a later article of the series, windows of other sizes will be considered and a convenient table given for converting them into "equivalent" number of the standard 2½-ft. by 5-ft. size.

Since this room has three windows, this is shown on the data sheet and by referring to Table 5 it is found that the additional heat loss due to three plain windows of the standard size is 4.3 (meaning 4,300 Btu per hour) which is entered in the heat loss column of room 101 as shown.

How Doors Are Calculated

As explained in the preceding installment, one outside door is assumed to be equivalent in heat loss to two windows. Room 101 has two outside doors of type "W" (weatherstripped) and this data is so recorded. These two doors are equivalent to four windows and this value (4) is entered in the column headed "Equiv. No. of Standard Windows." Reference to Table 5 shows that the heat loss for 4 weatherstripped windows is 5.8 and this value is entered in the "Heat Loss" column.

The heat losses are now totalled as 18.3 meaning that the heat requirement of room 101 as determined by the precalculated tables, is 18,300 Btu per hour. This assumes an outdoor temperature of zero with 70 degrees inside. If the inside-outside temperature difference is greater or less than 70 degrees, a correction may be applied as explained in connection with room 105.

The foregoing completes the heat loss tabulation for room 101.

For room 102 the same general procedure is followed. This room has unheated space above; therefore cold ceiling must be considered in estimating the heat loss. The space above is a finished room with a tight floor and Table No. 8 shows that the heat loss through a 14-ft. by 14-ft. cold ceiling having tight floor above is 4.3 (or 4,300 Btu per hour). This value is entered in the heat loss column of data pertaining to room 102. The total heat loss of the room is 17.5 or 17,500 Btu per hour.

The data tabulated for rooms 103 and 104 probably need no explanation.

Using Precalculated Tables

Note that room 105 has a different outside wall construction (shown on the data sheet as "standard frame") which common designation is open to objection. It will be noted in referring to the accompanying Table No. 5, that each type of wall has an identifying number. The same was true of Table No. 3 in the January issue and will apply to other tables to follow. It would be better, we believe, to show on the data sheet, the number which definitely establishes the wall construction. Table No. 3 showed that a frame wall consisting of siding, wood sheathing, studding, lath and plaster was designated as wall type No. 1. Therefore, to prevent possible confusion, it would be better to show the construction of the exposed wall of room 105 as "No. 1." Likewise, the other rooms would be designated as having wall "No. 24" which Table No. 5 shows as the identifying number for a 12-inch brick wall with plaster applied directly to the inner surface.

Since room 105 has Type No. 1 exposed wall, it is necessary to refer to Table No. 3 (January issue) in which that type of wall is listed. This table is used for both the heat loss through the wall and through the windows. The ceiling loss will be found

[Tables on pages 48, 49. Text on page 80]

TABLE 5 [Heat Transmission Coefficient—0.35]

Heat Loss Through Gross Exposed Wall (Temp. Diff. 70 Deg.)

Running feet exposed wall	Ceiling height, feet 8	9	10	Running feet exposed wall	Ceiling height, feet 8	9	10
4	0.8	0.9	1.0	37	7.3	8.2	9.1
5	1.0	1.1	1.2	38	7.4	8.4	9.3
6	1.2	1.3	1.5	39	7.6	8.6	9.6
7	1.4	1.5	1.7	40	7.8	8.8	9.8
8	1.6	1.8	2.0	41	8.0	9.0	10.0
9	1.8	2.0	2.2	42	8.2	9.3	10.3
10	2.0	2.2	2.5	43	8.4	9.5	10.5
11	2.2	2.4	2.7	44	8.6	9.7	10.8
12	2.4	2.6	2.9	45	8.8	9.9	11.0
13	2.5	2.9	3.2	46	9.0	10.1	11.3
14	2.7	3.1	3.4	47	9.2	10.4	11.5
15	2.9	3.3	3.7	48	9.4	10.6	11.8
16	3.1	3.5	3.9	49	9.6	10.8	12.0
17	3.3	3.7	4.2	50	9.8	11.0	12.3
18	3.5	4.0	4.4	51	10.1	11.2	12.5
19	3.7	4.2	4.7	52	10.2	11.5	12.7
20	3.9	4.4	4.9	53	10.4	11.7	13.0
21	4.1	4.6	5.1	54	10.6	11.9	13.2
22	4.3	4.9	5.4	55	10.8	12.1	13.5
23	4.5	5.1	5.6	56	11.0	12.3	13.7
24	4.7	5.3	5.9	57	11.2	12.6	14.0
25	4.9	5.5	6.1	58	11.4	12.8	14.2
26	5.1	5.7	6.4	59	11.6	13.0	14.5
27	5.3	6.0	6.6	60	11.8	13.2	14.7
28	5.5	6.2	6.9	61	12.1	13.5	14.9
29	5.7	6.4	7.1	62	12.2	13.7	15.2
30	5.9	6.6	7.4	63	12.3	13.9	15.4
31	6.1	6.8	7.6	64	12.5	14.1	15.7
32	6.3	7.1	7.8	65	12.7	14.3	15.9
33	6.5	7.3	8.1	66	12.9	14.6	16.2
34	6.7	7.5	8.3	67	13.1	14.8	16.4
35	6.9	7.7	8.6	68	13.3	15.0	16.7
36	7.1	7.9	8.8	69	13.5	15.2	16.9
				70	13.7	15.4	17.2
				71	13.9	15.7	17.4
				72	14.1	15.9	17.6

Wall Types to Which This Table Applies

No.	Type of Wall	Outside Finish	Inside Finish	Heat Trans. Coef.
5	Frame	Clapboards on studding, no sheathing	Lath & Plaster	0.35
8	Frame	Asphalt or asbestos shingles on wood sheathing NOT furred	Lath & Plaster	0.33
24	Brick	12-in. solid brick wall	½-in. plaster on brick	0.34
27	6-in. Hollow Tile	Brick Veneer	½-in. plaster on tile	0.34
31	8-in. Concrete Block	Stucco	Lath & Plaster furred	0.34
39	8-in. Cinder Block	Brick Veneer	½-in. plaster on block	0.33
42	8-in. Haydite Block	Stucco	½-in. plaster on block	0.34

Add For Windows

Type	Number of equivalent windows 1	2	3	4	5	6	7	8	9	10
Plain — no weatherstrip, no storm sash	1.7	3.5	5.2	7.0	8.7	10.5	12.2	14.0	15.7	17.4
Weatherstrip only—no storm sash	1.4	2.9	4.3	5.8	7.2	8.7	10.1	11.6	13.0	14.4
Storm sash only - no weatherstrip	1.4	2.8	4.2	5.6	7.0	8.4	9.8	11.2	12.5	13.9
Both weatherstrip and storm sash	1.1	2.2	3.3	4.4	5.5	6.6	7.7	8.8	9.8	10.9

TABLE 8—Heat Loss Through Cold Ceiling

Room	No Floor Above	Tight	Room	No Floor Above	Tight	Room	No Floor Above	Tight

TABLE 8—Heat Loss Through Cold Ceiling

Room Dimensions Feet	No Floor Above: No Insulation	No Floor Above: 3⅝" Rock Wool or Equiv.	Tight Floor Above
4x 4	0.4	0.1	0.2
4x 5	0.4	0.1	0.3
4x 6	0.5	0.1	0.3
4x 7	0.6	0.1	0.4
4x 8	0.7	0.2	0.4
4x 9	0.8	0.2	0.5
4x10	0.9	0.2	0.6
5x 5	0.6	0.1	0.4
5x 6	0.7	0.2	0.4
5x 7	0.8	0.2	0.5
5x 8	0.9	0.2	0.6
5x 9	1.0	0.2	0.6
5x10	1.1	0.3	0.7
6x 6	0.8	0.2	0.5
6x 7	0.9	0.2	0.6
6x 8	1.1	0.2	0.7
6x 9	1.2	0.3	0.8
6x10	1.3	0.3	0.8
6x11	1.5	0.3	0.9
6x12	1.6	0.4	1.0
7x 7	1.1	0.2	0.7
7x 8	1.2	0.3	0.8
7x 9	1.4	0.3	0.9
7x10	1.5	0.4	1.0
7x11	1.7	0.4	1.1
7x12	1.9	0.4	1.2
7x13	2.0	0.5	1.3
7x14	2.2	0.5	1.4
8x 8	1.4	0.3	0.9
8x 9	1.6	0.4	1.0
8x10	1.8	0.4	1.1
8x11	1.9	0.4	1.2
8x12	2.1	0.5	1.3
8x13	2.3	0.5	1.5
8x14	2.5	0.6	1.6
8x15	2.6	0.6	1.7
8x16	2.8	0.6	1.8
9x 9	1.8	0.4	1.1
9x10	2.0	0.5	1.3
9x11	2.2	0.5	1.4
9x12	2.4	0.5	1.5
9x13	2.6	0.6	1.6
9x14	2.8	0.6	1.8
9x15	3.0	0.7	1.9
9x16	3.2	0.7	2.0
9x17	3.4	0.8	2.1
9x18	3.6	0.8	2.3
10x10	2.2	0.5	1.4
10x11	2.4	0.6	1.5
10x12	2.6	0.6	1.7
10x13	2.9	0.7	1.8
10x14	3.1	0.7	2.0
10x15	3.3	0.8	2.1
10x16	3.5	0.8	2.2
10x17	3.7	0.9	2.4
10x18	4.0	0.9	2.5
10x19	4.2	1.0	2.7
10x20	4.4	1.0	2.8
11x11	2.7	0.6	1.7
11x12	2.9	0.7	1.9
11x13	3.2	0.7	2.0
11x14	3.4	0.8	2.2
11x15	3.6	0.8	2.3
11x16	3.9	0.9	2.5
11x17	4.1	0.9	2.6
11x18	4.4	1.0	2.8
11x19	4.6	1.0	2.9
11x20	4.9	1.1	3.1
11x21	5.1	1.2	3.2
11x22	5.3	1.2	3.4
12x12	3.2	0.7	2.0
12x13	3.4	0.8	2.2
12x14	3.7	0.8	2.4
12x15	4.0	0.9	2.5
12x16	4.2	1.0	2.7
12x17	4.5	1.0	2.8
12x18	4.8	1.1	3.0
12x19	5.0	1.1	3.2
12x20	5.3	1.2	3.4
12x21	5.6	1.3	3.5
12x22	5.8	1.3	3.7
12x23	6.1	1.4	3.9
12x24	6.3	1.4	4.0
13x13	3.7	0.8	2.4
13x14	4.0	0.9	2.6
13x15	4.3	1.0	2.7
13x16	4.6	1.0	2.9
13x17	4.9	1.1	3.1
13x18	5.2	1.2	3.3
13x19	5.4	1.2	3.5
13x20	5.7	1.3	3.6
13x21	6.0	1.4	3.8
13x22	6.3	1.4	4.0
13x23	6.6	1.5	4.2
13x24	6.9	1.6	4.4
13x25	7.2	1.6	4.6
13x26	7.4	1.7	4.8
14x14	4.3	1.0	2.8
14x15	5.6	1.1	2.9
14x16	4.9	1.1	3.1
14x17	5.2	1.2	3.3
14x18	5.5	1.3	3.5
14x19	5.9	1.3	3.7
14x20	6.2	1.4	3.9
14x21	6.5	1.5	4.1
14x22	6.8	1.5	4.3
14x23	7.1	1.6	4.5
14x24	7.4	1.7	4.7
14x25	7.7	1.8	4.9
14x26	8.0	1.8	5.1
14x27	8.3	1.9	5.3
14x28	8.6	2.0	5.5
15x15	5.0	1.1	3.2
15x16	5.3	1.2	3.4
15x17	5.6	1.3	3.6
15x18	5.9	1.4	3.8
15x19	6.3	1.4	4.0
15x20	6.6	1.5	4.2
15x21	6.9	1.6	4.4
15x22	7.3	1.7	4.6
15x23	7.6	1.7	4.8
15x24	7.9	1.8	5.0
15x25	8.3	1.9	5.3
15x26	8.6	2.0	5.5
15x27	8.9	2.0	5.7
15x28	9.2	2.1	5.9
15x29	9.6	2.2	6.1
15x30	9.9	2.3	6.3
16x16	5.6	1.3	3.6
16x17	6.0	1.4	3.8
16x18	6.3	1.4	4.0
16x19	6.7	1.5	4.3
16x20	7.0	1.6	4.5
16x21	7.4	1.7	4.7
16x22	7.8	1.8	4.9
16x23	8.1	1.8	5.2
16x24	8.5	1.9	5.4
16x25	8.8	2.0	5.6
16x26	9.2	2.1	5.8
16x27	9.5	2.2	6.1
16x28	9.9	2.2	6.3
16x29	10.2	2.3	6.5
16x30	10.6	2.4	6.7
16x31	10.9	2.5	7.0
16x32	11.3	2.6	7.2
17x17	6.4	1.4	4.1
17x18	6.7	1.5	4.3
17x19	7.1	1.6	4.5
17x20	7.5	1.7	4.8
17x21	7.9	1.8	5.0
17x22	8.2	1.9	5.2
17x23	8.6	2.0	5.5
17x24	9.0	2.0	5.7
17x25	9.4	2.1	6.0
17x26	9.7	2.2	6.2
17x27	10.1	2.3	6.4
17x28	10.5	2.4	6.7
17x29	10.8	2.5	6.9
17x30	11.2	2.6	7.1
17x31	11.6	2.6	7.4
17x32	12.0	2.7	7.6
17x33	12.4	2.8	7.9
17x34	12.7	2.9	8.1
18x18	7.1	1.6	4.5
18x19	7.5	1.7	4.8
18x20	7.9	1.8	5.0
18x21	8.3	1.9	5.3
18x22	8.7	2.0	5.5
18x23	9.1	2.1	5.8
18x24	9.5	2.2	6.1
18x25	9.9	2.3	6.3
18x26	10.3	2.3	6.6
18x27	10.7	2.4	6.8
18x28	11.1	2.5	7.1
18x29	11.5	2.6	7.3
18x30	11.9	2.7	7.6
18x31	12.3	2.8	7.8
18x32	12.7	2.9	8.1
18x33	13.1	3.0	8.3
18x34	13.5	3.1	8.6
18x35	13.9	3.2	8.8
18x36	14.2	3.2	9.1

So You Think Second Floor Returns Are Not Needed?

By B. L. Schwartz
Pittsburgh, Penna.

BACK in 1931 (about the time the depression was really beginning to go places) the J. W. Crandalls decided to build themselves a new home. The story of how they chose their heating system and the details of its installation was told in the May 9, 1932, issue of the American Artisan. Developments in connection with this plant since that time makes an interesting story.

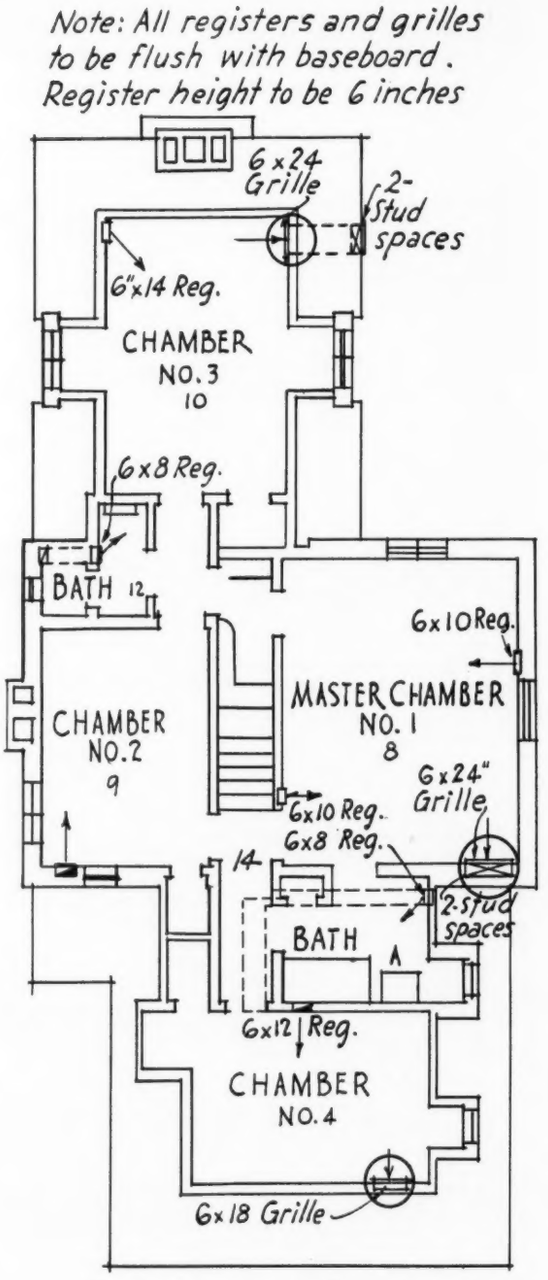
The original system was laid out by the Bryant Air Conditioning Corporation and was installed in accordance with this layout by the Schwartz Furnace Co. The unit used was a No. 3-LF-73 Bryant Air Conditioner equipped with a squirrel cage type blower, filters, automatic humidifier, etc. This unit is still producing in a very satisfactory manner; but our story concerns itself primarily with the results of the installation and the corrections needed.

A back glance to the original layout shows base type supplies and returns. There are three supplies and two returns serving the living room; a room which is eight inches lower than the rest of the rooms on the first floor. The hall had one supply and one return in the original installation, with the return grill to one side of the arched opening between the living room and the hall. Returns from the dining room and the breakfast room completes the accounting of total returns; as there were none originally installed from the second floor.

Competition Killed Upstairs Returns

Going back into retrospect, Mr. Crandall and the writer recalled that when the job was first contemplated, competition had established a setup of "no cold air returns from the second floor" which was written into the specifications. The mistake of this became very apparent during the second winter, after the first flush of satisfaction with the system in general had worn off; and particularly after John W. Crandall, Junior arrived on the scene to crawl around on the floor. Large volumes of air sweeping across the living room floor created a cold, drafty condition which was at its worst at the foot of the stairs leading from the second floor.

Various attempts were made to correct this condition, including an additional return at the foot of the stairs; but nothing seemed to work with any satisfaction. The air movement down the stairs



Circles indicate returns installed to stop stair draft.

still continued in such volume as to be positively annoying; to say the least.

Along Came an Insulation Salesman

About this time, an enterprising insulation salesman entered into the picture and convinced Mr. Crandall that an insulation job in his home would solve his problem and correct the trouble. By this time Mr. Crandall was ready to try almost anything; so he entered into a contract for complete insulation in so far as it could be installed in an existing home. The work was completed in December of 1932 at a cost of $235.00.

As may be surmised, this made no change in the air movement down the stairs; but it did result in

241 Orchard Drive S.Hills Sts.
Pittsburgh Pa.
Nov 19 1932

Mr. Jno.W.Crandall
7001 Penn Ave
Pittsburgh Pa.

Dear Sir.

I propose to furnish and install four inches of house insulation,unless the space to receive the material is more or less than four inches in which case the space will be filled,to the following areas in your house.All flat and sloping second floor ceiling areas all ashler walls,all exterior living room walls and first floor ceiling over living room between ashler wall and exterior walls, also dormer ceiling and side walls areas.

For the sum of ----------$235.00

Terms cash upon completion of contract;

Yours Very Truly

M.F. Snell

OFFICE PHONE: STERLING 1772

RESIDENCE: 6827 STANDISH STREET E. E., PITTSBURGH, PA. HILAND 0410-W

JOSEPH A. THOMAS

—All kinds of Sheet Metal Work—

HEATING - VENTILATING - DUCT WORK - CORNICES
SKYLIGHTS - COPPER WORK - MACHINE GUARDS
FURNACES - ROOFING AND SPOUTING

03098

308 So. MAIN STREET
SHARPSBURG, PA. Jan.22,1937

IN ACCOUNT WITH
Mr.J.W.Crandall
7001 Penn Ave.,
Pittsburgh,Pa.

TERMS:

Furnishing you with three registers and sheet metal duct work as directed by you.

$44.00

Received in full
Feb 8, 1937
Joseph A. Thomas
Thanks

Date Feb. 3, 1932

No 105

Sold To Mr. J. W. Crandel, 7001 Penn Avenue, Pittsburgh, Pa.

Our Order No. 1112 Salesman Mr. Knorr

Terms: Weather Strip—Cash on completion of work. Screens etc., 50% on delivery, balance on completion of work

Installing Equipment as agreed: at above address.

$ 45.00

for Kitchen Shutters for Lotes

PAID FEB 12 1932 THANK YOU

Please receipt and Return

Pittsburgh, Pa.

Mr. J. Crandall, 7001 Penn Avenue, Pittsburgh, Pa.

March 6, 1935

Terms Net Cash

Order No. 31-[illegible]8-16 2843-2686 Hardman-Shaninger

Installing Equipment as agreed:

Equipment installed at: your residence

3 Winter Windows and Steel Sash

Weather Stripping.

$ 147.30

PAID THANK YOU MAR 11 1935

Please receipt and return

Date Sept 23, 1936

Mr. John W. Crandall, 7001 Penn Avenue, Pittsburgh, Pa.

No 5471

TERMS: as per contract agreement. Our Order No. WW 61 Salesman Armstrong

Installing Equipment as agreed (double) WINTER WINDOWS $ 305.50

Please don't forget that there is one small window not completed as yet

JAG.

Please receipt and return

The bills reproduced here show how $732.80 was spent to correct a condition which could have been prevented originally for less than $50.00. The correction finally arrived at, as related in this article, amounted to $44.00. Perhaps this is an answer to the question—"Shall we buy second floor returns?"

raising the temperature of the return air and in this manner helped a little.

The Crandall family are gluttons for punishment; and they decided about this time that there was nothing that could be done about the air movement and so reconciled themselves to an acceptance of it. In due time, Nancy Jane came along to remind her mother and father that the floors were still cold and drafty; and that she didn't like it at all. So in March, 1935, weather stripping was installed all over the house in an effort to reduce the amount of cold air infiltration. This totalled to $147.30; and was in addition to an item of $45.00 covering weather stripping for the three outside doors previously done.

This expenditure helped a little; but there was still money to be spent in trying to solve the problem. In September of 1936, Mr. Crandall invested $305.50 in one fell swoop to have double windows installed all over the house. And still the return air kept coming down the stairs in large volumes.

Up to this time, this owner had spent $732.80 for

HEATING COSTS OF BRYANT GAS FIRED AIR CONDITIONER.
J. W. CRANDALL RESIDENCE - 7001 PENN AVE. - PITTSBURGH.

APPROXIMATE PERIOD	1932			1933			1934			1935			1936			1937		
	MCF USED	DAYS	COST	MCF USED	DAYS	COST	MCF USED	DAYS	COST	MCF USED	DAYS	COST	MCF USED	DAYS	COST	MCF USED	DAYS	COST
SEP. 15 TO OCT. 15	13	30	7.80	15	31	9.00	16	29	9.45	18	28	10.35	12	29	7.20	18	31	10.35
OCT. 15 TO NOV. 15	27	31	13.40 16.20	34	32	17.55	30	29	15.75	17	28	9.90	27	31	14.40	27	30	14.40
NOV. 15 TO DEC. 15	43	32	21.65 25.80	36	30	18.45	36	31	18.45	39	33	19.80	36	30	18.45	44	30	22.05
DEC. 15 TO JAN. 15	41	33	20.70 24.60	33	30	17.10 19.80	40	30	20.25	40	31	20.25	46	31	22.95	32	30	16.65
JAN. 15 TO FEB. 15	41	30	20.70 24.60	39	30	19.80 23.40	45	28	22.50	41	29	20.70	57	31	27.90	38	31	19.35
FEB. 15 TO MAR. 15	53	32	26.10 31.80	36	30	18.45 21.60	44	28	22.05	35	28	18.00	38	28	19.35	38	29	19.80
MAR. 15 TO APR. 15	28	26	14.85 16.80	25	30	13.50	24	33	13.05	26	31	13.95	30	29	15.75	29	30	15.30
APR. 15 TO MAY 15	19	31	10.80 11.40	22	30	12.15	29	30	15.30	20	31	11.25	19	29	10.80	204	33	11.43
8 MONTHS {GROSS TOTALS}			$136.00			$126.00			$136.80			$124.20			$136.80			$129.33
ESTIMATED DOMESTIC CONSUMPTION @ 3.00/MONTH			24.00			24.00			24.00			24.00			24.00			24.00
NET HTG. COSTS →			$112.00			$102.00			$112.80			$100.20			$112.80			$105.33

insulation, weather stripping and double windows in trying to overcome a trouble which later proved to be caused by a lack of returns from the second floor. Yet this expenditure, amounting to more than 50% of the cost of the original installation (and being almost as much as many similar size jobs are being installed for today), failed to correct the trouble or satisfy the owners and occupants of this home.

So We Went Back to Returns

Naturally reluctant to admit an error, the matter of emphasizing the advisability of installing returns from the second floor was not pressed until the fall of 1936; and after the other additional work had failed to correct the trouble. Finally in January, 1937 three returns were ordered for as many rooms on the second floor. Two returns were installed immediately; the third was under way as this article is written. The total cost involved amounted to but $44.00; but the immediate difference was highly gratifying. Mr. Crandall advised that the draft coming down the stairs was reduced with two returns to less than 25% of what it was before these returns were installed; and at this writing, the third bedroom return on the second floor is expected to completely stop the draft coming down the stairs.

Thus ends a story of an actual experience which indicates a real necessity for installing returns from as many rooms as possible; and particularly from second floor bedrooms.

The Cost of 6 Years Fuel

The tabulation of actual fuel bills during this entire period is reproduced herewith and shows some interesting data. For purposes of comparison, the actual gas bills as rendered prior to March, 1933 have been recalculated on the present cost basis. Prior to March, 1933, gas costs in Pittsburgh were at a flat rate of 60c per MCF. Following March, 1933, only the first 15 MCF are at the 60c rate; and all subsequent consumption in each month is billed at a flat 45c rate.

It will be noted that total fuel consumption did not vary more than five percent from the average over the entire six year period. This would indicate that as an investment for fuel savings, the cost of insulation, etc. is not justified. However, there are other factors which enter into the picture and which should be considered. More uniform heating results can be obtained in an insulated home than is possible otherwise. The temperature can be brought up more quickly after the customary night turn down. There is also the matter of a cooler home in summer. On this basis insulation is a worthwhile investment.

Weather stripping, and particularly double windows, are also good investments. Moisture con-

(*Continued on page* 80)

Why Humidify?

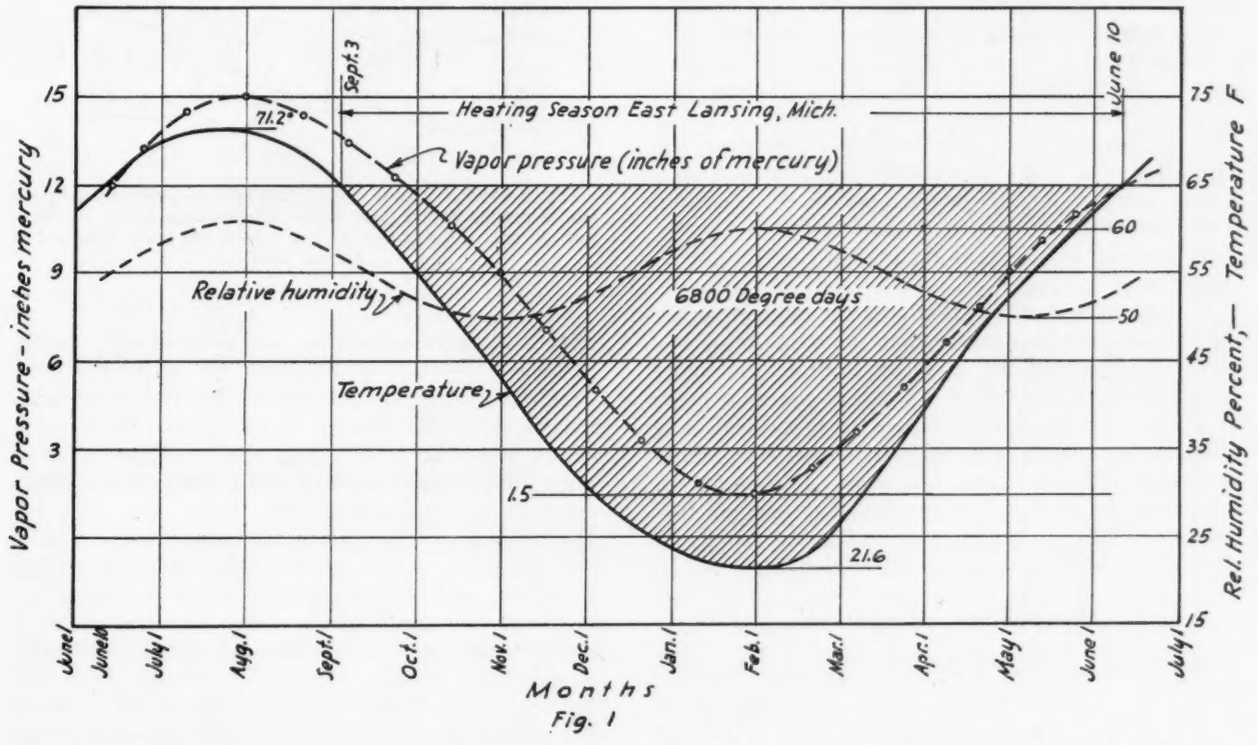
By Lorin G. Miller,

Professor, Mechanical Engineering Dept.,
Michigan State College

WHEN a problem involving comfort presents itself for solution, the first and natural question that comes to mind is "how does nature solve it?" It is quite logical then when considering humidity to wonder how much moisture is in the air on those balmy spring and fall days shared by almost the whole of the United States.

Investigation of weather bureau reports reveals that on those invigorating "peppy" days, the temperature is apt to be just on the cool side of the comfortable and the relative humidity varying between 40% and 50%. No doubt this type of weather is largely responsible for the fact that a great part of the advancement in the art of living may be accredited to those races having their abode where such conditions prevail. A further glance at mother nature's performance shows that in the hot noonday in midsummer and again the cold noonday of midwinter, the relative humidity advances to 60 per cent or thereabouts.

Fig. I shows a plot of the average daily heating season temperature at East Lansing, Michigan. Except for differences in maximum and minimum temperatures and slightly varying dates, this graph can easily represent conditions embracing a large majority of our United States population. It might be noted in passing that the shaded area below the 65-degree F. line represents the degree-day heating season for East Lansing, and that the line from September 3 to June 10 indicates the length of the heating season. The dotted line on this sheet shows approximately how the daytime relative humidity varies throughout the year. The fact that the relative humidity wave has twice the frequency



Average daily heating season temperatures for East Lansing, Mich., with shaded area showing degree days for the season and relative humidities for the season. Also relative humidity swings.

of the seasonal temperature variation prompts one to add a third line representing absolute humidity or vapor pressure. This line follows the temperature line in its seasonal variation.

Aside from special cases of industrial humidity control, comfort is the objective of the person who adds to or takes from the moisture content of the air. It seems in order, therefore, to consider briefly the conditions which contribute to comfort.

In the process of changing food into usable energy, conducting it to the required location and using or converting the energy into storage form, some heat is generated. If the individual being considered is in good health, in a stable mental condition and at rest, the heat generated is somewhere between 350 and 400 Btu. per hour. Since the muscular and nervous system is not 100% efficient, if our subject is doing some work, walking, lifting, pushing, or what not, he will have an excess amount of heat generated which has also to be eliminated.

The Body Is a Heat Machine

Now the body is a constant temperature machine, at least so far as its internal organs are concerned. If this heat were allowed to accumulate in the body, the temperature would, of course, rise. At rest, a 200-pound man would increase his temperature about two degrees Fahrenheit per hour. In health this rise in temperature is not allowed. The thermostat is set at 98.6 F., and a tendency to increase above that opens the dampers in the capillaries carrying blood near the surface and allows the blood to circulate near the surface where it may deposit its load of heat before returning to the interior for another load. The reverse is, of course, true in case of dropping temperature. One has only to visualize the reddened face of a perspiring person or the blanched appearance of a freezing ear to realize the extremes of these conditions.

As a supplement to this scheme of temperature regulation, the body thermostat stimulates sweat glands located in the lower portion of the skin layer and they deliver a watery solution to the outer surface of the skin through a duct connecting them (Fig. II).

A point to be noted is that comfort depends upon the rate of heat loss rather than upon the temperature. To illustrate, let us recall some of the times when we have had what we call a common cold, involving just a slight increase in body and skin temperature. Now if temperature was our index, we would feel too warm, but from our experience, we know the chilled feeling that accompanies this condition, due in part at least to the too rapid dissipation of heat from an overheated body.

How Moisture Is Evaporated

The human body is not greatly different than any other object whose outside surface is about 20 to 22 square feet in extent, at approximately 85 F. in temperature and enveloped in a more or less continuous film of water. It will radiate heat to objects whose temperature is lower than its own at a rate which will vary with the difference of the fourth powers of the absolute temperatures. Heat will be carried from its surface by convection due to the currents of air that are set up by elements of the heating system, i. e. fans, radiators, heaters, etc., or by the heat given off from its own surface. When the space surrounding the body is not saturated with water vapor, this enveloping film will constantly give off particles of vapor by evaporation. This evaporation requires heat, partly furnished by the skin and partly by the air currents, which furnishes another outlet for the body heat.

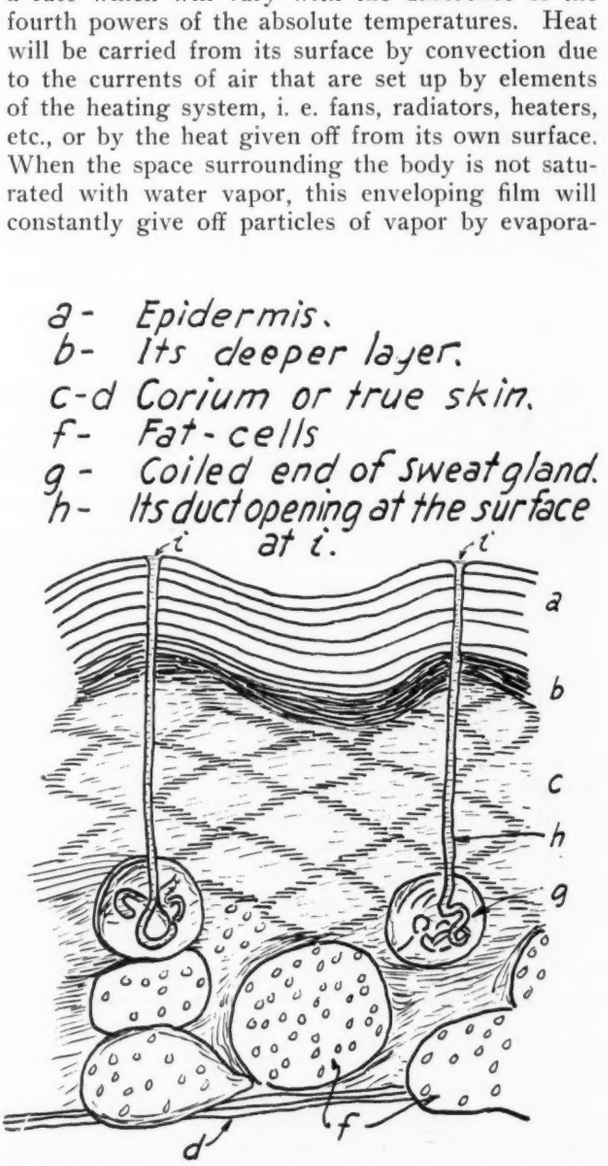


Fig. 2—Sweat glands in the skin secrete a watery solution which carries bodily heat to the skin surface where evaporation occurs. This is one way in which the body disposes of excess heat.

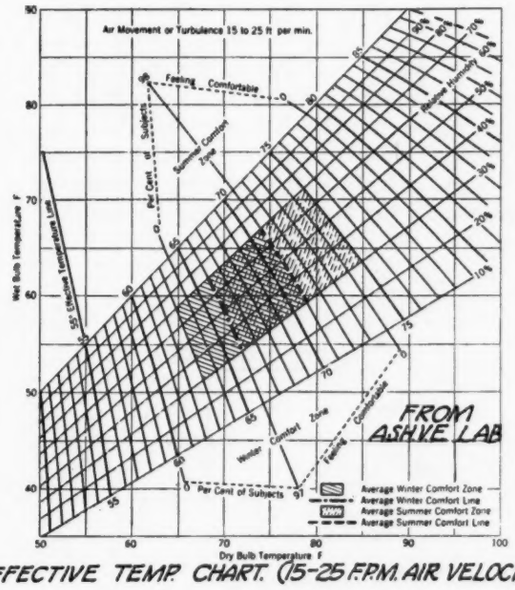
It is with this film of water, exuded from thousands of sweat glands, and the resultant layer of high temperature vapor and air that we are interested in this discussion. We have seen that, due to the activity of the molecules of water at a surface, there is a stream of vapor particles leaving the water and attempting to saturate the space immediately surrounding the body. Physical chemists prove to us that the rate of evaporation is directly proportional to the difference in vapor pressure between that of the liquid and that of its vapor in the surrounding space. The vapor pressure of the water film will depend upon the temperature, and the vapor pressure of the surrounding space which

will take its value from the amount of vapor already in the space. Since it requires heat to effect this evaporation, and since the heat must come largely from the skin, it follows that lower humidities promote a feeling of lower temperature, and is one of the contributing factors in comfort.

Due to the attraction of a heavy body, there is surrounding and enveloping every such body a layer of air and vapor which by its very nature acts as an insulator. Due to its density it limits the amount of heat that may be radiated to or from the surface. On account of its inactivity, it prevents air currents from direct contact with the surface, and thus restricts removal of heat in this manner. Vapor particles leaving the water film must first pass through this blanket of air and vapor by diffusion before they are in free space, hence the vaporization process too is hampered. Passage of currents of air over the body will reduce the thickness of this layer and effect the heat transfer accordingly. Higher velocity air currents, of course, having greater effect than lower. On account of this varying effect, velocity of air current is considered one of the factors in defining the comfort zone.

The Comfort Chart

Considering that these four factors, viz., air temperature, air movement, temperature of surrounding objects, and humidity, were the main contributing features to comfort, several laboratories



EFFECTIVE TEMP. CHART. (15-25 F.P.M. AIR VELOCITY)

The familiar comfort chart of the ASHVE showing zones of winter and summer comfort for average healthy individuals.

have studied the effect of the various combinations. The result of the findings is usually made visual in the form of a comfort chart where a definite area represents conditions described as comfortable for a majority of tested subjects.

Roughly these charts allow temperatures to vary from 74 to 79 degrees Fahrenheit with 70% to 30% relative humidity, respectively, in gently moving air in summer time and a variation of from 67 to 72 degrees Fahrenheit and 70% to 30% relative humidity in winter. With the advent of panel heating, better insulation and walls warmed by forced circulation, the effect of the higher temperature surroundings, is also making its way into the comfort zone. The conclusion we may reach from all this is that there are many combinations of air temperature, wall temperature, air movement, and humidity that will result in comfort. Selection of a proper combination for the type of heating or cooling system is a matter of engineering judgment.

How Low Humidity?

It is apparent that inquiry into conditions of comfort will not answer the question "why humidify?" Since by their own testimony they are comfortable at almost any degree of humidity. Because it is difficult and costly to maintain, it is not necessary to consider trying to produce high humidities, say above 50% relative humidity, at the temperature required for comfort. How much lower than 50% relative humidity we may go with safety is still something of a question.

Effect of Low Humidity

The New York State Commission found that exposure for eight hours per day, five days per week, at 75 F. and 25% relative humidity did not produce harmful effects. Many other experiences substantiate this report as essentially true for persons in normal health. It is quite commonly agreed that persons low in vitality are aided by high humidity. It is common knowledge, too, that dust is more noticeable when the humidity is low, the wood in the house and furniture shrinks and static discharges are even more noticeable. These features will aid in fixing the lowest humidity.

Health vs. Comfort

It is to be noted that this group reporting upon comfortable temperatures were satisfied with about seven degrees warmer environment in summer than in winter. This is due to that psychological something we call acclimatization. Seven degrees differences in perception during 60 degree actual change is nearly 10 per cent. The change in vapor pressure in nature's realm follows nearly the same cycle as the temperature (again refer to Fig. 1). It is logical therefore to assume that the same acclimatization occurs with respect to humidity, namely, an optimum of 10 per cent lower vapor pressures in winter than in summer. This would place the reasonable relative humidity for heating season operation at 30% to 35%. Whims, wishes, desires, feelings, poor health, or other abnormal conditions may ask for high humidities, but the needs of the great majority of healthy persons will remain at the lower values.

[To be continued]

Forced Air Heating Facts From the Research Residence—

How To Measure Air Volumes

By S. Konzo

Special Research Assistant Professor
Engineering Experiment Station
University of Illinois

THE accurate determination of the quantity of air passing through a duct or register opening is a most difficult task even under laboratory conditions. Correct determinations can be made if the apparatus and equipment are so arranged that:

a. there are no air leaks in the duct ahead of the measuring station, or around the register frame,
b. properly calibrated instruments are used by experienced observers,
c. the air flow is steady, non-pulsating, and varies uniformly from point to point in the duct,
d. turbulent conditions of flow are minimized by the use of straighteners, turning vanes, and smooth approach sections,
e. the measuring station is not adjacent to projections, dampers, changes in cross-section, and other discontinuities in the duct section,
f. in those cases in which pressure tubes are used, seamless rubber tubing is used for connections, and all joints are made air-tight.

The Pitot Tube

The arrangement of the ducts and pitot tube for testing centrifugal fans as specified in the "Standard Test Code for Disc and Propeller Fans, Centrifugal Fans and Blowers" (adopted by The National Association of Fan Manufacturers, and The American Society of Heating and Ventilating Engineers) is an example of a good laboratory arrangement for determinations of air volumes. Fig. 1 shows the main requirements as specified by the Code, together with some modifications that have been found to be of benefit.

An acceptable design for pitot tubes is shown in Fig. 2. It may be noted that the instrument is composed of two tubes, one inside of the other. The inner tube, which is placed in the duct so that the central axis of the tube is parallel with the main air stream, records the "total pressure" in the duct. The "static pressure" is transmitted through the small holes which lead from the surface of the outer tube to the space enclosed between the two

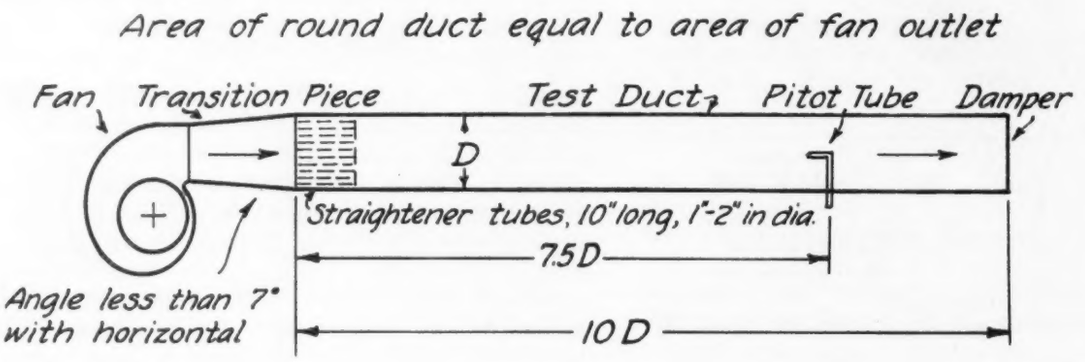
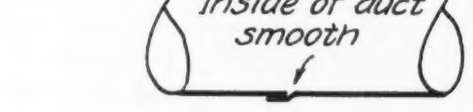


Fig 1 — Arrangement for testing centrifugal fan. (As recommended in "Standard Test Code for Disc and Propellor Fans, Centrifugal Fans and Blowers.")



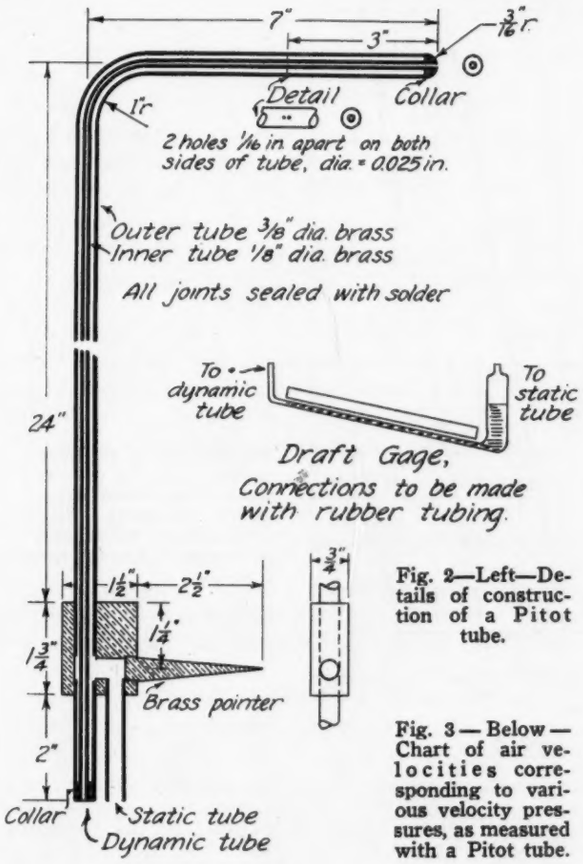


Fig. 2—Left—Details of construction of a Pitot tube.

Fig. 3 — Below — Chart of air velocities corresponding to various velocity pressures, as measured with a Pitot tube.

tubes. This pressure is transmitted to the static tube connection. When the pitot tube is connected to a manometer, or inclined gage as shown in the inset in Fig. 2, the differential pressure indicated by the gage is the "velocity pressure" of the air stream.

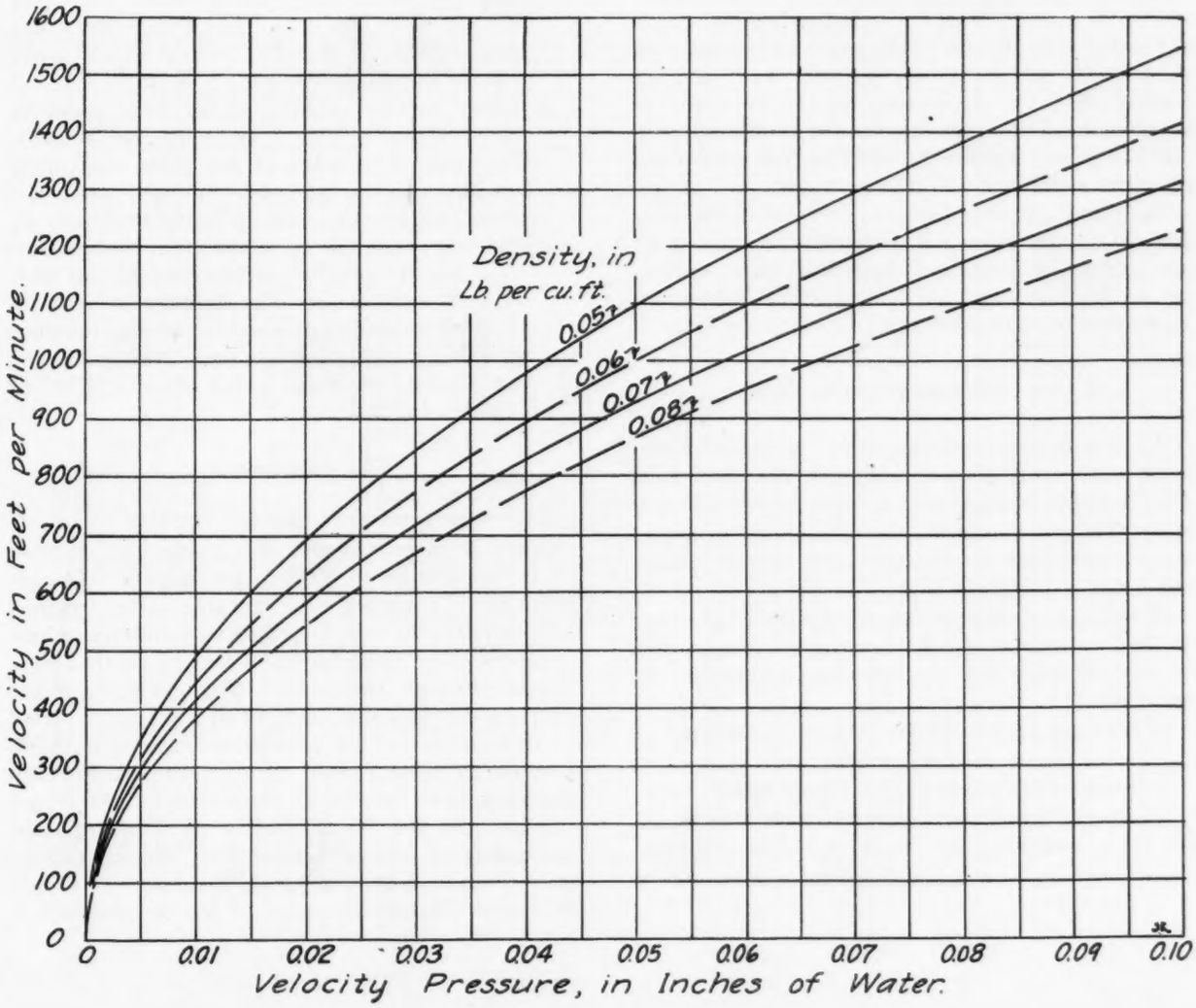
The air velocity may be determined from the following equation:

$$\text{Velocity in ft. per minute} = 1096.2 \times \frac{\sqrt{h}}{\sqrt{d}} \quad \ldots (1)$$

in which,

h = velocity pressure, in inches of water
d = density of air at measuring station, in lb. per cu. ft.

The curves shown in Fig. 3 may be used in place of equation (1). For example, a velocity pressure of 0.07 in., obtained with an air density of 0.07 lb. per cu. ft., corresponds to a velocity of about 1100 ft. per minute. The determination of the value of the air density to be used in equation (1) and Fig. 3 may be conveniently made from Fig. 4, provided that the temperature of the air and the barometric pressure of the air are known. In case the static pressure in the duct at the measuring station exceeds approximately one-quarter inch of mercury, that pressure must be added to the existing barometric pressure, and the revised "barometric pressure" must be used in obtaining the air density in the duct at the measuring station.



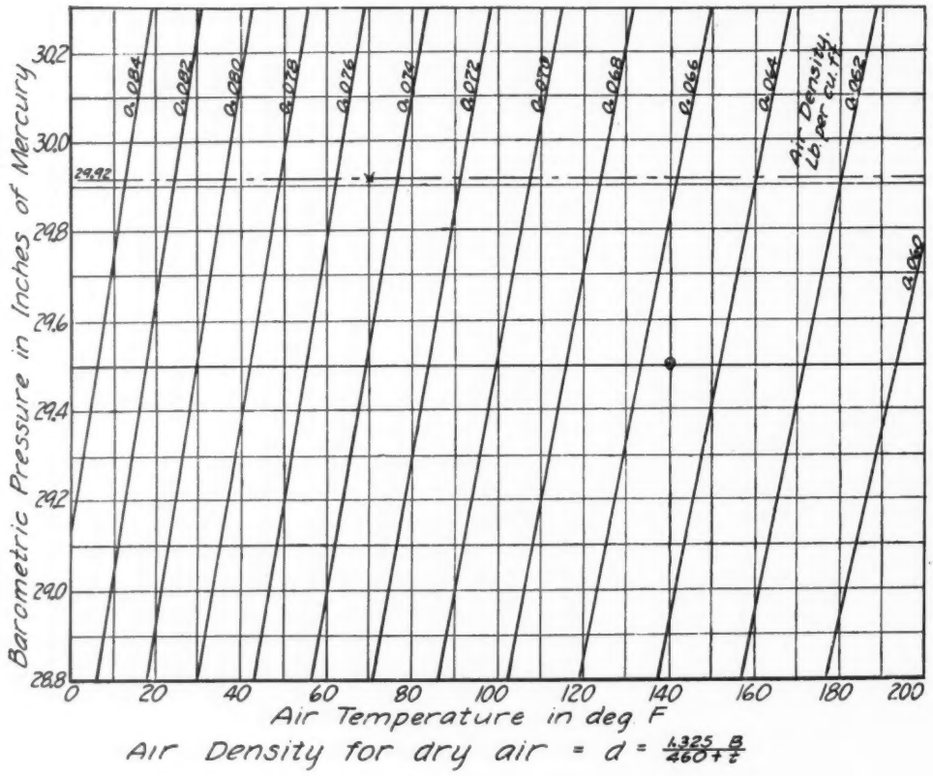


Fig. 4—Curves showing density of air for various temperatures and barometric pressures. Values based on dry air and determined from the equation,

$$d = \frac{1.325\ B}{460 + T}$$

It may be noted from Fig. 3 that for air velocities less than approximately 700 ft. per minute the magnitudes of the velocity pressure are smaller than 0.03 in. of water. With the ordinary inclined gages it is rather difficult to read the gages any closer than about 0.002 in. An error of 0.002 in. in a gage reading of 0.030 in. corresponds to an error of 6 per cent. Hence, the pitot tube is usually considered as an instrument suitable for measuring velocities exceeding 700 ft. per minute.

The pitot tube may be used for velocities smaller than 700 ft. per minute if extremely sensitive pressure gages (such as the Illinois micro-manometer) are used. The latter gage is strictly a laboratory instrument and requires most careful handling.

How Pitot Tube Should Be Used

When properly used and under favorable conditions, such as is shown in Fig. 1, the pitot tube gives reliable results with a high degree of accuracy. The pitot tube may be considered as a precision instrument for measurement of high velocities only.

In ordinary field applications the pitot tube may be used to measure the air velocity in straight runs of duct provided that the following conditions are maintained:

a. The measuring station should be selected at some point in the straight duct that is at least 10 diameters distance from bends, turns, changes in section, dampers, obstructions, etc.

b. The measurements should be confined to relatively high velocities, preferably over 700 ft. per minute.

c. The rubber hose connections to the pressure gages must be air-tight. The inclined type gage is to be used for velocity pressures greater than one inch. The gages must first be levelled. The zero reading of the gage should be checked when no air is flowing.

d. Since the air velocity varies from point to point across a duct, a large number of readings should be made at any given measuring station. In the case of rectangular ducts, the duct cross-section should be divided into an arbitrary number of rectangular spaces and the velocity pressure determined in the middle of each space. The average velocity in the duct may be obtained by adding together the individual velocities and dividing by the number of readings. This process is called "traversing a duct."

The Anemometer

The vane-type anemometer, familiar to all, is adapted to measurements of air velocities of from 75 ft. per minute to 3000 ft. per minute. The instrument is equipped with movable vanes attached to a central axis that is geared to a counter, which indicates the number of lineal feet of air that have passed through the vanes. For example, if the anemometer is placed in front of a jet for a period of 10 minutes and the counter indicates that 16,000 feet of air have passed through the vanes, then the average air velocity of the stream is 1,600 ft. per minute. At the U. S. Bureau of Standards, the anemometers are calibrated with the instrument placed on an arm rotating in open air. It should be noted that the accuracy of the anemometer is

dependent on the calibration of the instrument, and for laboratory purposes proper calibration corrections should be applied to all readings made with the anemometer. On account of the friction in the bearings the instrument will not give consistent or accurate values for velocities less than about 75 ft. per minute.

In the Warm Air Furnace Research Investigations the anemometer has frequently been used as a secondary instrument, and has been calibrated in position against a more precise primary instrument, such as the pitot tube. The details of an arrangement in which the anemometer was used for determining the air volume delivered at the register face is shown in Fig. 6. The calibration curve in the lower right hand corner of the figure shows an example in which the anemometer reading indicated 159 ft. per minute, whereas the true average velocity at the register face was 223 ft. per minute. Once the calibration curve has been established for a given set of conditions the anemometer may be used for all subsequent readings and the correct velocities may be obtained from the calibration curve.

In ordinary field applications the anemometer is frequently placed at the outlet opening of a duct or in front of a register for the purpose of determining the velocity and the volume of the air issuing from the opening. In many small installations, the only available method of determining the output delivery of a fan as installed is to determine the air volumes at each of the register openings and to obtain the sum of the individual volumes.

The results of the experimental work conducted at Armour Institute of Technology by Lynn E. Davies has been presented in an article entitled, "How to Use the Anemometer" (The Aerologist, March 1932 pp. 27-31). As a result of these experiments, which were made with the anemometer frame held in contact with the grille, Professor Davies proposed the following formulas:

Supply Grille

$$\text{C. f. m.} = \frac{C\,V\,(A + a)}{2} \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

in which,

C = a coefficient, (in a majority of cases "C" has a value so close to unity that for practical purposes it may be omitted from the formula).

V = velocity indicated by anemometer traverse, after applying anemometer correction, in feet per minute. Anemometer held in contact with grille.

A = Gross area of grille in square feet.

a = Net free area of grille in square feet.

Exhaust Grille

$$\text{C. f. m.} = K\,V\,A \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

in which,

V = Velocity indicated by anemometer traverse in feet per minute. Anemometer held with dial face in contact with grille.

A = Gross area of grille in square feet.

K = Coefficient. For approximate results a value of 0.8 should be used.

(*Continued on page* 78)

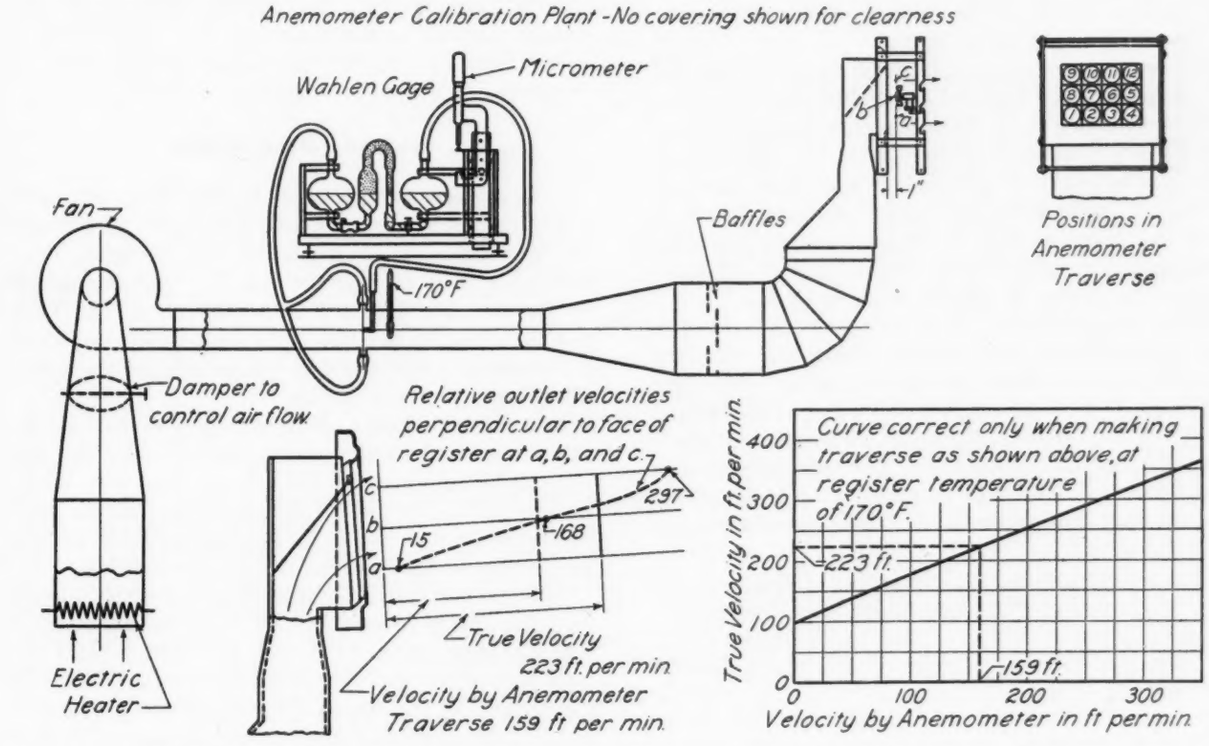


Fig. 6—Sectional view of plant for calibrating register outlet anemometers, showing details of operation. (From U. of I. Bulletin 112)

Pattern Development for

Air Conditioning Fittings*

By William Neubecker
Head Instructor
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Compound Offset Elbow, Curved Corners

IN the previous problem in Fig. 26 (December, 1937) was shown the pattern development of a double offset for rectangular duct with *angular corners*. In the problem shown in the accompanying drawings in Fig. 27 a similar double offset is shown in which *curved corners* are indicated solved by *radial line* development.

Compound Offset Elbow, Curved Corners

Laying out an offset of this type with curved corners requires more time than an offset with angular corners. The principles shown in this radial line development are applicable to any size compound offset elbow with curved corners, regardless of whether the projection *A-O* or *O-B* in plan are similar or not; or whether the radius *H-a* for striking the upper curve in the true elevation is similar to the radius *J-F* for striking the lower curve, or otherwise.

There is no necessity for drawing a front or side elevation. All that is required is a plan view. *A* in plan indicates the profile of the rectangular duct at the top and *B* the profile at the bottom. Draw the diagonals in both profiles *A* and *B* and obtain the centers *A* and *B*. Make the horizontal and vertical distances between these two points as desired. In other words, the offset projects to the right a distance equal to *A-O* and leans towards the reader a distance equal to *O-B*.

Draw a line from *A* to *B* and number the corners in both profiles 1 to *4* as shown. Below the plan and parallel to *A-B*, draw any line as A^1-B^1. At right angles to A^1-B^1 draw the line *C-D* equal to the desired height of the offset and through *D* parallel to A^1-B^1 draw the line *E-F* indefinitely. The true elevation can now be drawn. From the corners 1 to *4* in the profile *A* draw lines at right angles to *A-B* to intersect the line *A'-B'* as shown.

In a similar manner at right angles to *A-B* from the corners in profile *B* draw lines to intersect the line *E-F*, all as indicated. Establish at pleasure the radius of the throat *x-H* at the top and using H as a center describe the heel arc *a-M*.

*All rights reserved.

In this problem a similar radius will be used for the lower curve (or could be made smaller or larger as desired). Therefore take the distance *a-H*, the top radius, and set it off on the bottom line from *F* to *J*. Using *J* as a center with radius equal to *J-i* draw the arc *i-L*. Now tangent to the lower and upper arcs, draw the line *e-f*. At right angles to *e-f* from the center point *H* at the top, draw a radial line to intersect the line *e-f* at *e*.

In a similar manner at right angles to *e-f* draw a line from the center point *J* at the bottom, to intersect the line *e-f* at *f* and extend it indefinitely. Now from the various intersections previously obtained on the upper line *a-H* draw arcs, using *H* as center to intersect the line *e-H* as shown. In a similar manner using *J* on the lower line as a center, draw arcs to intersect the line *J-s*, using as radii the various intersections previously obtained on the lower line *F-J*. Connect these intersections by straight lines shown in the center of elevation. This completes the true elevation.

Radii of Pattern Shapes

It now becomes necessary to find the radii with which the pattern shapes are developed, as follows: At right angles to A^1-B^1 in the true elevation, from the center point *H* erect the line *H-U* and intersect it by the line 1-*4* extended in profile *A*, at *U*. Then *U*-1 and *U-4* become the radii with which the *outer* and *inner* arcs are struck in the pattern for the *upper elbow curve* for the *wide side* 1-*4*.

In a similar manner at right angles to *E-F* in the true elevation from the center point *J*, erect the line *J-Y*, and intersect it, by the line *4*-1 in profile B extended, at *V*. Then will *V*-1 and *V-4* be the radii with which the *inner* and *outer* arcs are struck in the pattern for the *lower elbow* curve for the *wide side* 1-*4*.

Now extend the line 1-*2* in profile *A* until it intersects the line previously erected from the center *H* in true elevation, at *X*. *X*-1 and *X-2* then become the radii with which the *outer* and *inner* arcs are struck in the pattern for the *upper elbow curve* for the *narrow side* 1-*2*. In a similar manner extend the line *2*-1 in pro-

COMPOUND OFFSET ELBOW FOR RECTANGULAR DUCT WITH CURVED CORNERS

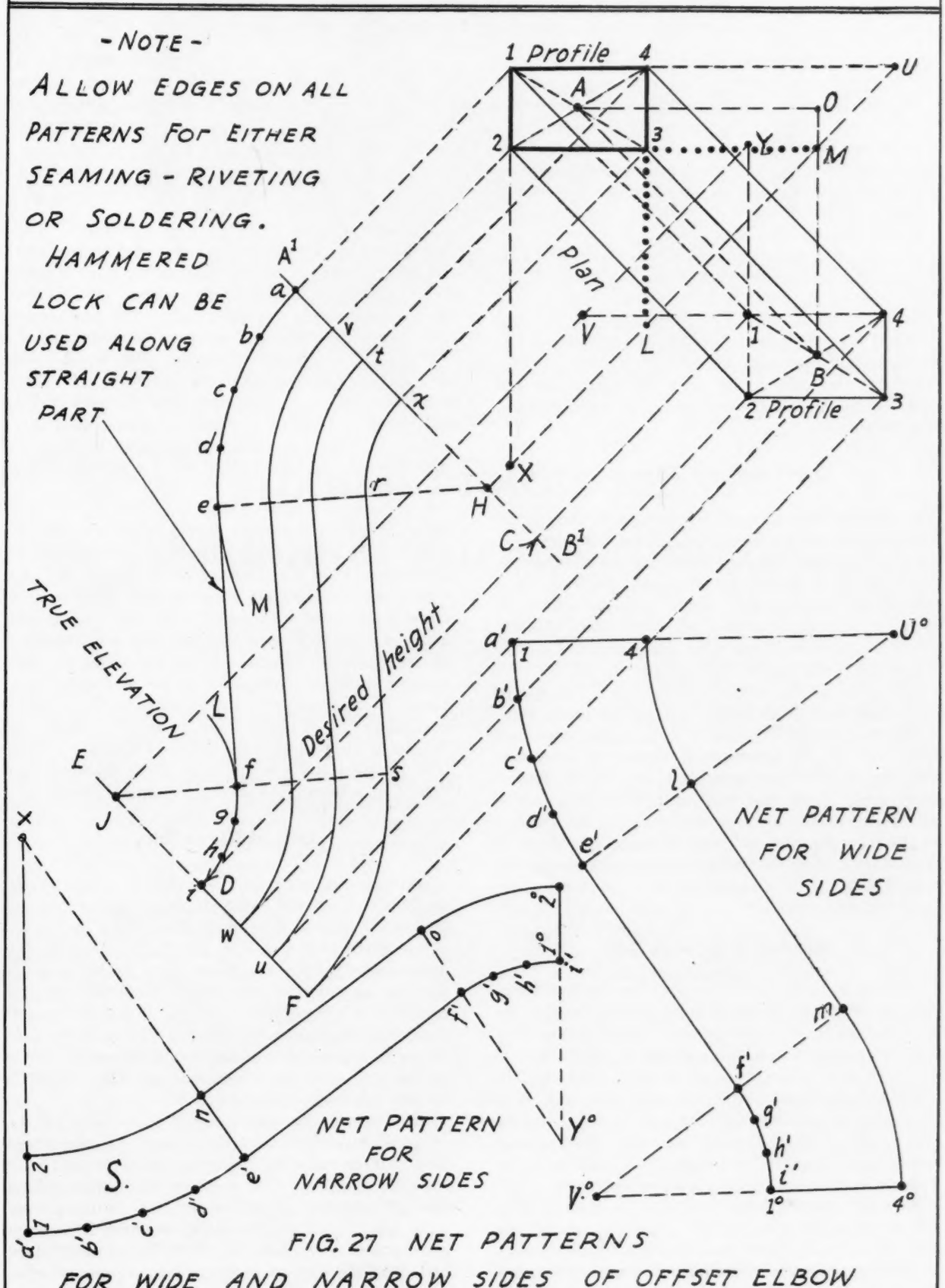

-NOTE-
ALLOW EDGES ON ALL PATTERNS FOR EITHER SEAMING - RIVETING OR SOLDERING. HAMMERED LOCK CAN BE USED ALONG STRAIGHT PART
1 Profile
2 Profile
Plan
TRUE ELEVATION
Desired height
NET PATTERN FOR WIDE SIDES
NET PATTERN FOR NARROW SIDES

FIG. 27 NET PATTERNS FOR WIDE AND NARROW SIDES OF OFFSET ELBOW

file *B* until it intersects the line previously erected from the center *J* in true elevation, at *Y*. Then *Y*-1 and *Y*-2 will be the radii with which the *inner* and *outer* arcs are struck in the pattern for the *lower elbow curve* for the *narrow side* 1-2.

Radii From One Profile

So that the reader may understand the true principles involved in laying out offset elbows of this type, it is proper to explain how the radii for striking the arcs for the upper and lower curves could in this problem be obtained from the one profile *A* at the top. For example: If the line 4-3 in profile *A* is extended, it will intersect the line erected from the center point *H* at *L;* then *L*-3 and *L*-4 will have the same length as *Y*-1 and *Y*-2 previously obtained from profile *B*. Again if the line 2-3 in profile *A* is extended it will intersect the line erected from *H* in true elevation, at *M;* then *M*-2 and *M*-3 will have the same length as *V*-4 and *V*-1 previously obtained from profile *B*. It should be understood that this only occurs when the *throat and heel radii* for the *upper and lower curves* in the true elevation are *similar*.

When Radii Are Different

If different radii are used for striking the upper and lower curves of the elbow shown in the true elevation, we must then find the radii for laying out the patterns from profiles *A* and *B* as previously obtained. It is only when both top and bottom radii are similar in elevation, that the simplified rule can be used. Having found the radii for developing the patterns, the wide side of the elbow will be laid out first.

Referring to the true elevation, space the curved outline obtained from corner 1 in profile *A*, in equal divisions as shown from *a* to *e* in the upper curve and from *f* to *i* in the lower curve. Draw any line below the plan as *U*°-1 and using *U*-1 and *U*-4 in plan as radii and *U*° in the pattern as center draw the arcs *a'*-*e'* and 4-*l*, respectively. Now take the girth from *a* to *e* in the true elevation and step off these four divisions on the arc *a'*-*e'* in the pattern as shown by similar letters. From *e'* draw a radial line to *U*° intersecting the inner arc at *l*.

Net Pattern for Wide Sides

Now take the distance from *e* to *f* in the true elevation or the length of the straight portion between the arcs and set it off in the pattern on the lines *e'* to *f'* and *l* to *m* both of which are drawn at right angles to *e'*-*U*°. Draw a line from *m* through *f'* indefinitely. With a radius equal to *V*-4 in plan and with *m* in pattern as center intersect the line *m*-*U*° at *V*°. Using the same radius with *V*° as a center draw the arc *m*-4° indefinitely. Using *U*° as center with *V*°-*f'* as radius (which is similar to *V*-1 in plan) draw the arc *f'*-1° indefinitely. Set the dividers equal to the divisions from *f* to *i* in true elevation and step off the three divisions from *f'* to *i'* in the pattern as shown by similar letters.

Draw a line from *V*° through *i'* to intersect the arc at 4°. Then will 1-4-4°-1° be the net pattern for both of the wide sides of the duct shown by 1-4 and 2-3 in profiles *A* and *B* in plan.

It will be noted that the girth for the wide side pattern was taken along the curve *a*-*i* in the true elevation or the outline projected from the corners 1 in both profiles *A* and *B*. If desired the girth could be placed along the curve 4-4° in the pattern by simply taking the girth along the curved outline *t* to *u* in the true elevation which was projected from the corners 4 in both profiles *A* and *B*. The results in the pattern would be the same.

Pattern for Narrow Sides

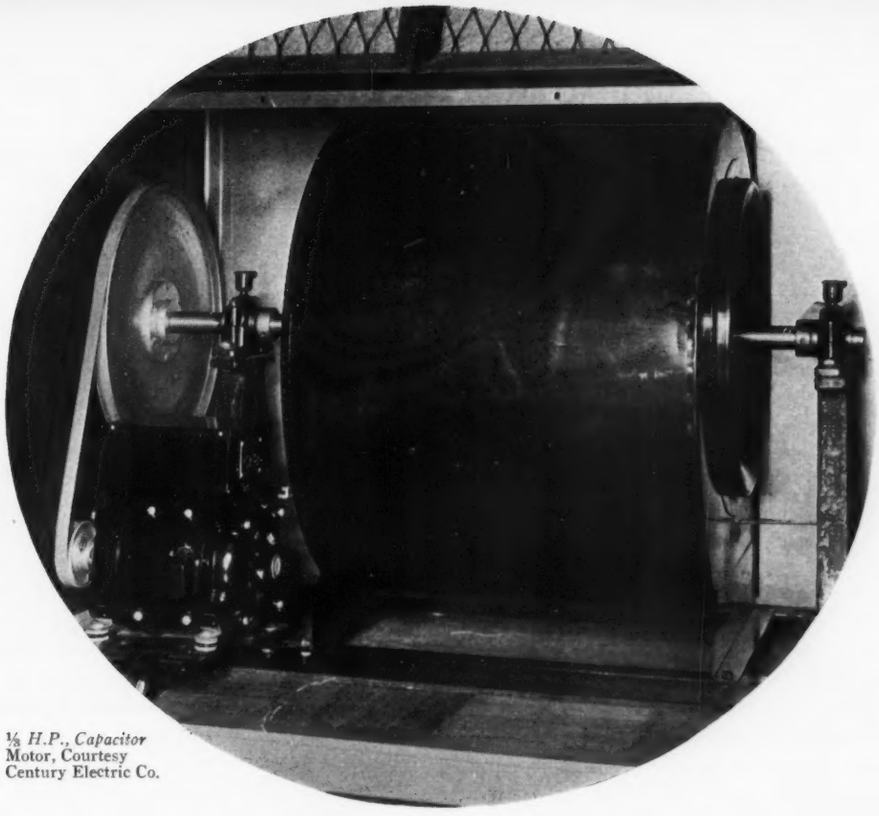
The same rule is used in developing the pattern shape for the narrow sides of the duct, shown in the lower left hand corner in a reverse position for want of space. Draw any line as *X*-1 in the narrow side pattern, which is designated *S*. Using *X*-1 and *X*-2 in plan as radii and *X*, in pattern *S* as center, describe the arcs *a'*-*e'* and 2-*n* respectively. As the girth for the wide side pattern was taken along the outline *a* to *i* in true elevation which was projected from the corners 1 in both profiles *A* and *B* in plan, then take similar girth from *a* to *e* in true elevation and place it along the outer arc *a'*-*e'* in the pattern for the narrow side *S* as shown by similar letters.

From *e'* draw a radial line to *X* intersecting the inner arc at *n*. Take the distance from *e* to *f* in the true elevation or the length of the straight portion between the arcs and set it off in the pattern on the lines *e'* to *f'* and *n* to *o*, both of which are drawn at right angle to *e'*-*X*. Draw a line from *o* through *f'* indefinitely. Now with a radius equal to *Y*-2 in plan and with *o* in pattern *S* as center intersect the line *o*-*Y*° at *Y*°. Using the same radius with *Y*° as center draw the arc *o*-2° indefinitely. Using *Y*° as center with radius equal to *Y*°-*f'* (which is equal to *Y*-1 in plan) draw the arc *f'*-*i'* indefinitely. Set the dividers equal to the divisions from *f* to *i* in the true elevation and step off these three divisions from *f'* to *i'* in pattern *S*, as shown by similar letters.

Girth of Narrow Sides

Draw a radial line from *Y*° through *i'* to intersect the arc at 2°. Then will 1-2-2°-1° be the net pattern for both of the narrow sides of the duct shown by 1-2 and 4-3 in profiles *A* and *B* in plan. The girth for this narrow side pattern was taken along the curve *a*-*i* in the true elevation or the outline projected from the corners 1 in both profiles *A* and *B*. If desired the girth could be placed along the curve 2-2° in pattern *S*, by simply taking the girth along the curved outline *v* to *w* in the true elevation which was projected from the corners 2 in both profiles *A* and *B*.

The result in the pattern would be the same. If this offset elbow were of large dimensions, it can be assembled in three parts, making a joint along *e*-*r* and *f*-*s* in the true elevation. Care must be taken when joining the various sides. Start at 1 and join the narrow and wide side so that there will be two halves, one right and one left. Then turn one of the halves upside down and join together to complete the compound offset elbow with curved corners.



⅛ H.P., Capacitor Motor, Courtesy Century Electric Co.

Small Motors for Residential Air Conditioning

By C. H. Lankford
Century Electric Company

THE selection of motors for residential air conditioning boils down to a comparison of the characteristics of individual motors; then torque, starting current, light flicker and quiet operation, coupled with the requirement of the apparatus being driven, bearing in mind that there are often times several motors which may be selected for each individual piece of apparatus.

The first characteristic for consideration is torques—starting torque, pull-in torque, and maximum torque. On all motors it is important to consider quiet operation, and last, as well as often least important on these smaller jobs, is economy of operation. From the viewpoint of the user and the Public Utility supplying the current there would also be questions of starting current and the resulting light flicker.

Fortunately for the average installation, the contractor need not assume responsibility for selecting the motor because this is usually done by the equipment manufacturer. The smaller sizes of fans, blowers, oil burners, stokers, refrigeration compressors and pumps are invariably equipped with motors when delivered. However, the day eventually comes when a piece of apparatus must be remotored by the contractor or by the service man on the job. It is then necessary to know the kind of motor required.

Voltage fluctuation and light flicker caused by heavy starting currents may not be matters of importance on household appliances, such as washing machines, mangles, vacuum cleaners, and other items operated in the daytime only, powered by motors which have been designated as "short annual service characteristic" motors. The air conditioning apparatus does not recognize daylight and dark, therefore, precludes the use of anything but the better type of motor known as the "long-hour service characteristic" motor.

Alternating Current Motors

Alternating current motors are divided into two principal groups:

1. Single phase motors.
2. Polyphase motors.

Whether the motors shall be single phase or polyphase depends upon two factors—the current available and the requirements of the job.

When the utility furnishing the current determines that a particular installation is sufficiently large to warrant the installation of polyphase service it is ordinarily understood that the major portion of the motor driven equipment will be constructed for polyphase current and that the smaller motors will be for single phase current.

Single Phase Motors

If we are to include the smallest of the single phase motors there will be four general types as follows:

1. Shaded pole motors.
2. Split phase motors.
3. Capacitor type motors.
4. Repulsion start induction run motors.

The shaded pole motor ranges in size from 1/30 HP downward and is used only for shaft mounted fans. It is not a motor which is available to the general public, having to be engineered for the individual job and is mentioned here only as a matter of information.

The Capacitor Motor

Capacitor motors are available in ratings sufficiently large for any general purpose application in a residential air conditioning job. The types of capacitor motors usually available are:

1. Capacitor start, capacitor run high torque motor.
2. Capacitor start, induction run motor.
3. Capacitor start, medium torque.
4. Capacitor start and run, light starting duty.

The capacitor start and run high starting torque motor is generally available in sizes from ⅛ HP to about 10 HP and has sufficient torque for starting pumps, stokers, refrigeration compressors and similar applications.

The second type of motor mentioned—the capacitor start, induction run motor, usually stops around ¾ HP. This motor develops a heavy starting torque, but draws a fairly high starting current.

The capacitor start, induction run, medium torque motor and the capacitor start and capacitor run, light torque motor, are both used for the operation of fans (belted or direct connected), centrifugal pumps or any other light starting job. They are available in sizes from 1 HP to 10 HP.

The principal difference is that the capacitor start motor requires a higher starting current and has a lower power factor, while the light starting duty capacitor start and capacitor run motor, to be successful, must be loaded to at least 50% of capacity. This type of motor is reasonably quiet in operation when properly applied.

The power factor of capacitor type single phase motors is equal to capacitor run motors somewhat higher than the corresponding single phase repulsion start induction run motor.

The locked rotor amperes of single phase capacitor motors will average about 50% higher than for single phase repulsion start induction motors while the locked rotor torque of the capacitor motor is on an average about 30% less than the corresponding repulsion start motor.

The maximum running torque of a capacitor motor is somewhat less than the maximum torque of the repulsion start induction motor, usually in the neighborhood of about 8%. These are for the average products now available on the market.

The efficiency of the capacitor type, single phase motor, is equal to a slightly better than comparable single phase repulsion start induction run motor.

Capacitor type motors are available for either single speed or two speed operation.

Split Phase Motor

The split phase type of motor is usually available in sizes ¼ HP and less and is intended for service where a high starting torque is not necessary. This applies particularly to blowers, oil burners, and similar equipment where, there is little or no opportunity of imposing upon the motor overloads due to poor adjustment of the driven machine or overload might go beyond the motor's starting capacity. The starting current is quite high, which makes them less desirable than a motor with a lower starting current on account of the greater possibilities of voltage fluctuation and corresponding light flicker.

The split phase motor is sometimes used like the shaded pole motor for shaft mounted, propellor type fans, where the fan contributes to the cooling of the motor. For this application the ratings may go up to ½ HP.

Repulsion Start Induction Motor

The repulsion start induction motor has been used and proven successful for each and every item going to make up a complete air conditioning job. This includes compressors, blowers, oil burners, stokers, pumps and other motor driven accessories. This type of motor has as high a starting torque as any other single phase motor available and a starting current as low and generally lower than other types of single phase motors. This characteristic makes them particularly suitable for reciprocating loads—pumps, compressors and other inertia loads where the starting period might be drawn out to an objectionable point excepting for the high starting torque and the low starting current.

They are available in all sizes from ⅛ HP up and from a number of different sources of supply. For an installation where an absolute minimum of voltage fluctuation is desirable, no motor can surpass the repulsion start induction run design.

Polyphase Motors

Polyphase (2 or 3 Phase) motors are available in four common varieties as follows:

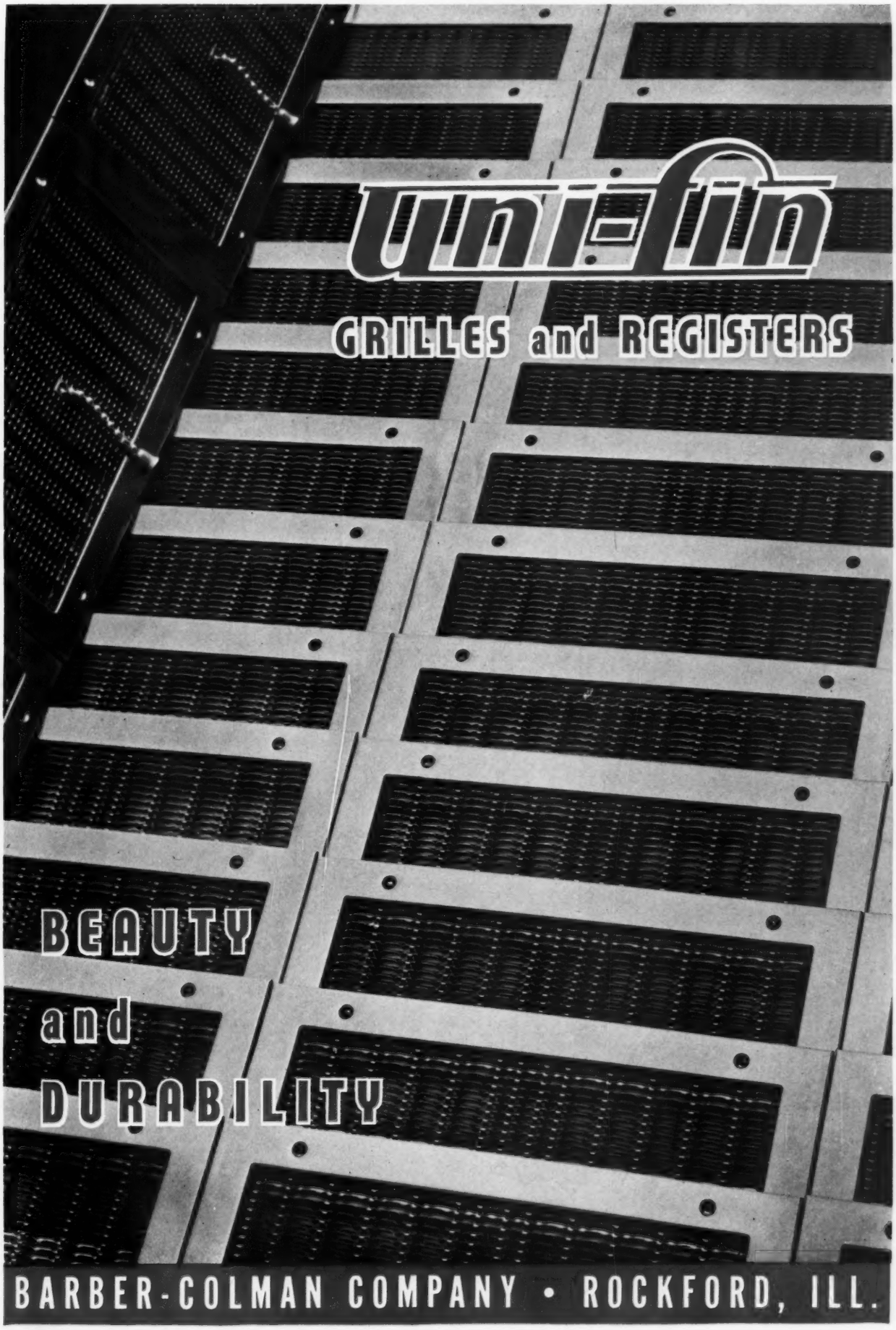
1. Squirrel Cage induction.
2. Automatic start induction.
3. Slip ring or wound rotor induction.
4. Synchronous motors.

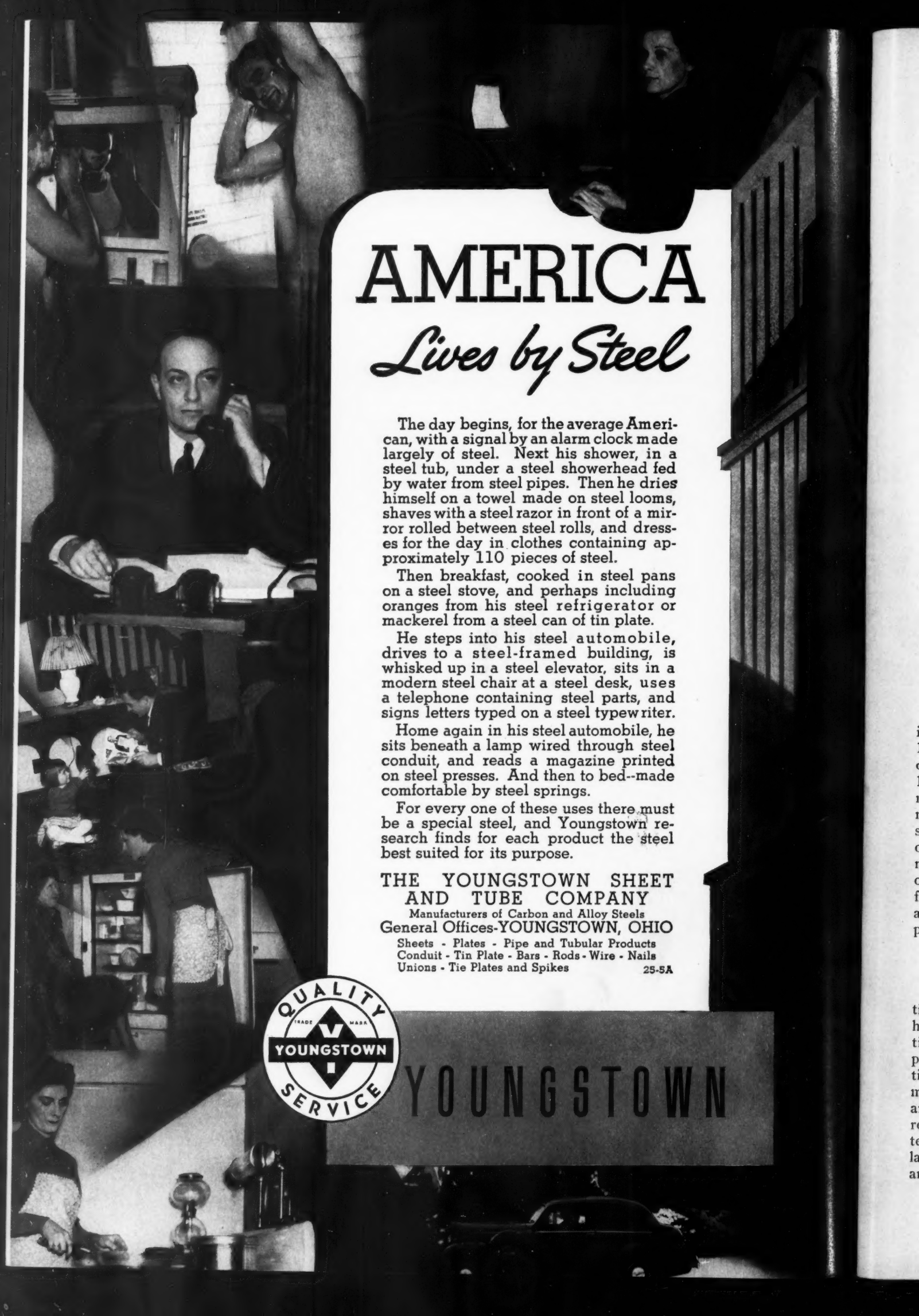
Squirrel Cage Induction Motors

The motor which we commonly refer to as a squirrel cage motor because of the mechanical construction of its rotor, is available in three common varieties as follows:

1. Normal torque, normal starting current.
2. Normal torque, low starting current.
3. High torque, low starting current.

(*Continued on page* 82)


Uni-Fin
GRILLES and REGISTERS
BEAUTY
and
DURABILITY
BARBER-COLMAN COMPANY • ROCKFORD, ILL.



AMERICA
Lives by Steel

The day begins, for the average American, with a signal by an alarm clock made largely of steel. Next his shower, in a steel tub, under a steel showerhead fed by water from steel pipes. Then he dries himself on a towel made on steel looms, shaves with a steel razor in front of a mirror rolled between steel rolls, and dresses for the day in clothes containing approximately 110 pieces of steel.

Then breakfast, cooked in steel pans on a steel stove, and perhaps including oranges from his steel refrigerator or mackerel from a steel can of tin plate.

He steps into his steel automobile, drives to a steel-framed building, is whisked up in a steel elevator, sits in a modern steel chair at a steel desk, uses a telephone containing steel parts, and signs letters typed on a steel typewriter.

Home again in his steel automobile, he sits beneath a lamp wired through steel conduit, and reads a magazine printed on steel presses. And then to bed--made comfortable by steel springs.

For every one of these uses there must be a special steel, and Youngstown research finds for each product the steel best suited for its purpose.

THE YOUNGSTOWN SHEET AND TUBE COMPANY
Manufacturers of Carbon and Alloy Steels
General Offices-YOUNGSTOWN, OHIO
Sheets - Plates - Pipe and Tubular Products
Conduit - Tin Plate - Bars - Rods - Wire - Nails
Unions - Tie Plates and Spikes 25-5A

QUALITY TRADE MARK YOUNGSTOWN SERVICE

YOUNGSTOWN

Officers for 1938, from left to right, rear—Charles Radtke, director; J. E. Peterson, director; seated—Ralph Poe, secretary; Joe Walters, president; Frank Eynatten, treasurer.

Illinois Association Resumes Activity

AFTER six years of inactivity (not counting the preliminary meeting held in Peoria in June, 1937), the Illinois Association again resumed active operation at the convention held in Peoria, January 19 and 20, 1938. Contractors representing most important sections of the state and cities unanimously expressed the opinion that the Illinois Association should resume its place among the leading organizations of the country. As a result of committee meetings and discussion from the floor, the officers and board of directors were authorized to furnish to all the contractors in the state, as soon as possible, a comprehensive outline of the proposed program for 1938.

Associations Are Necessary

Paul R. Jordan, secretary of the Indiana association, declared that every man owes something to his trade; if possible expressed through co-operation with local and state associations. That under present business conditions, co-operative association effort is more necessary than ever before since men in business need the co-operative protection and influence which comes only from co-operative representation in affairs of legislation or trade protection. That in the last five years compensation laws, lien laws, license laws, taxation of all types and varieties have increased at a tremendous rate so that in 1938 the average business man in warm air heating or sheet metal contracting finds himself faced with the need for some clearing house which will furnish complete information and represent his trade wherever such representation is required.

Mr. Jordan declared that in so far as mechanical ability is concerned, the sheet metal contractor is far above the average, but that as a business man he is sorely in need of educational work which can come most advantageously from association co-operative effort. As an example, Mr. Jordan cited the prevalence of price cutting, and declared that in his estimation only state and local association educational effort can educate dealers to appreciate the real cost of doing business.

Supplementing Mr. Jordan's appeal for closer co-operation; John Maier of Chicago Heights, holdover director, explained the co-operation now prevailing between the local unions, the trade schools and the contractors in the South Chicago area. Mr. Maier declared that in his opinion the Illinois association can progress most rapidly under a paid secretary given the task of organizing and securing membership and conducting the business affairs of the association.

George Harms, for forty years one of the active supporters of the Illinois Association declared that men in business today should not overlook enemy No. 1 (you and me) who thinks he knows it all and

is not willing to listen or learn. Mr. Harms declared he felt sure that only close local and state association work can convince this type of individual that he does not know it all and must progress with his fellow members of the trade.

Paul R. Jordan explained at some length, as a result of an inquiry from the floor, the operations of the secretary's conference. He explained that the secretaries of the states Wisconsin, Illinois, Indiana, Michigan and Ohio, had been meeting during the past year for the purpose of establishing a program of mutual benefit to all members in these states. As their first effort the Secretaries have convinced manufacturers of copper sheet that the item differential on copper is not fair; that if a contractor buys one sheet of 16 oz., 500 sheets of 20 oz. and 1 sheet of 18-oz. copper, he should be given a differential based upon the total volume and weight of the order and should not pay a price differential on the one sheet ordered. The mills have agreed to eliminate these item discounts.

Short Cut Patterns

Ralph Poe of Canton, demonstrated his short-cut method of pattern drafting with a large number of samples. Mr. Poe explained that his idea might be termed a "roll out" method and consists of visualizing and making galvanized iron half sections of the item which are then "rolled out" on black paper and when doubled furnish the proper pattern.

OFFICERS

Joe Walters, Ottawa, President.
C. H. Lohman, Galesburg, Vice President.
Ralph Poe, Canton, Secretary.
Frank Eynatten, Peoria, Treasurer.
J. E. Peterson, Hinsdale, Director, three years.
Charles Radtke, LaSalle, Director, two years.
W. W. Johns, Urbana, Director, one year.

AUXILIARY OFFICERS AND DIRECTORS

Elmer Eichenberger, Meyer Furnace Co., President.
Ray Smelzer, Scully Steel Products Co., 1st Vice President.
Ed Olson, Sheet Metal Products, Co., 2nd Vice President.
J. B. Souer, Meyer Furnace Co., Treasurer.
Etta Cohen, National Sheet Metal Contractor, Secretary.
A. C. McKinley, Eagle-Picher Lead Co., Director.
Ed Wilson, Ceco Steel Products Corp., Director.
H. H. Bartlett, Chase Brass & Copper Co., Director.
Art Mieche, Furblo Co., Director.
T. J. Coughlin, Sheet Metal Products Co., Director.

Selling Air Conditioning

F. E. Mehrings of Peoria, speaking on "Air Conditioning As It Applies to the Sheet Metal Contractor" reading excerpts from a prediction made five years ago that tailor-made ducts were the most practical said that after five years it still remains a question whether or not prefabricated materials can be as practical as tailor-made units. Mr. Mehrings foresaw five years ago a five billion dollar air conditioning market comparable with radio or electric refrigeration—today, greater health and comfort are universally demanded by the individual preparing to build a new house or to remodel his existing building. Five years ago Mr. Mehrings declared that residential air conditioning belonged to the sheet metal contractor—today the sheet metal contractor is rapidly becoming the accepted medium through which winter air conditioning is being given to the public.

As a note of warning, Mr. Mehrings pointed out that some recent surveys had shown that winter air conditioning, particularly of the automatic-fired type, is being handled and sold at an increasing rate by firms which can not be considered sheet metal contractors. Also, that some of the larger manufacturers who have entered the field are still uncertain as to the proper method of distribution, with the result that their outlets are selling equipment, but depending upon the sheet metal contractor to fabricate and install.

Mr. Mehrings declared that speaking as a manufacturer, a very appreciable number of inquiries for information on equipment comes from dealers of radios, refrigerators and items of that type, but, while his firm still holds to its original program of co-operating only with furnace dealers, if the furnace dealer does not evince sufficient interest in the newer developments in heating equipment, the time will come when manufacturers will be compelled to seek dealer outlet among this new class of dealer.

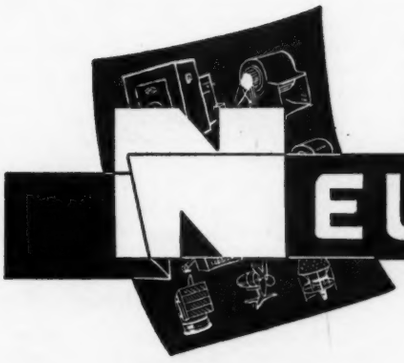
Louis Drehobl and R. A. Guenther representing the associations from Chicago explained the Chicago licensing law and what it has done for contractors and also some of the law's limitations. It was the concensus of the association that codes covering design and installation and licensing laws accompanied by adequate inspection are something to be advocated aggressively by the organization.

Moving Pictures

Through the courtesy of Republic Steel Corporation, a sound moving picture was displayed showing the manufacture of Enduro stainless steel completely through the mill with particular emphasis upon the finishing operations and on the many items now manufactured of Enduro stainless steel.

At the banquet, held on the evening of the first day, the American Rolling Mill Company of Middletown, Ohio, showed a sound film covering the manufacture of American Rolling Mill products.

At the Travellers Auxiliary meeting on Wednesday afternoon, the auxiliary went on record as wishing to co-operate to the greatest possible extent with the contractors to build up the membership of the contractors organization and to bring out for next year's convention just as large an attendance as possible. At the meeting to be held next April, all suggestions will be formulated into a plan which can be followed throughout the year.



For your convenience a number has been assigned each item. Check the items in which you are interested on the coupon on page 96 and mail to us. Complete information will be forwarded.

• Indicates product not listed in 1938 Directory.

△ Indicates product and manufacturer not listed in 1938 Directory.

NEW PRODUCTS

1—New Microstat

Julien P. Friez & Sons, Incorporated, of Baltimore, Maryland, announce a new microstat, or small thermostat, providing at low cost temperature control for heating or cooling equipment with an exceptionally small differen-

tial of control. These new microstats are especially designed for use on low voltages (25 volts), yet they are able to carry an electrical load of 75 watts directly off their contacts without recourse to Relays. These instruments are equally suited for domestic or industrial applications.

◆

2—Directaire

Fitzgibbons Boiler Company, Inc., 101 Park Avenue, New York City, announces the introduction of a direct fired air conditioner for residential use, to be known as the Fitzgibbons Di-

rectaire conditioner, in four sizes—100,000, Btu., 135,000 Btu., 200,000 Btu. and 300,000 Btu.—designed for oil, gas and stoker firing.

The unit is said to be quiet in operation, has controlled humidification, removable filters of spun glass impregnated with oil, and is adaptable for summer cooling. A compressor and cooling coils can be added.

◆

3—Grillometer

Detroit Air Meter Co., P. O. Box 1473, Detroit, Michigan, announces the "Grillometer" which they call "the yardstick of the air"—a direct reading vane type air meter. The dial instrument is adaptable to field use to measure air velocities and cfm at outlet or inlet grills at air velocities from 50 to 3,500 fpm.

◆

4—Coal or Oil Burning

The Corozone Air Conditioning Corporation of Cleveland announces their new Coroaire heater and winter air conditioner. This model is available either as a gas or oil burning heater.

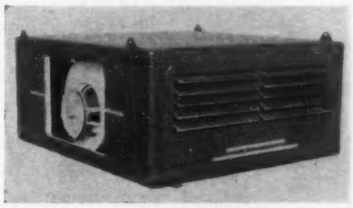
The Coroaire features Fan Circulation —(600 cu. ft. capacity), summer and winter operation; Humidification—two gallon capacity; Filtration; Ionization —deodorizing, purifying and revitalizing; Heating—hourly output of 41,500 Btu.

The finish is burled walnut grain.

5—Air Conditioning Unit

Pioneer Air Conditioning Corporation, Minneapols, announces the Model S-40 air conditioning unit, with a room capacity up to 25,000 cubic feet, depending on conditions.

The cooling element is of special de-



sign for tap water cooling—all copper tubes and all copper fins. When used for heating, the unit is said to handle up to 100 pounds of steam pressure.

The motor is ¼ h.p., cushion mounted, 1750 r.p.m. There are two Arco viscous throw-away type filters. Humidity condensate drain is in back of the unit. The finish is brown, gray or black crackle, chrome trimmed. Louvres are adjustable, chromium plated, directional flow.

◆

6—Junior Arc Welder

The Hobart Brothers Co., Troy, Ohio, announces a "Junior Model" 200 ampere gasoline engine driven arc welder to meet the demand for a unit of smaller size and lighter weight than existing models.

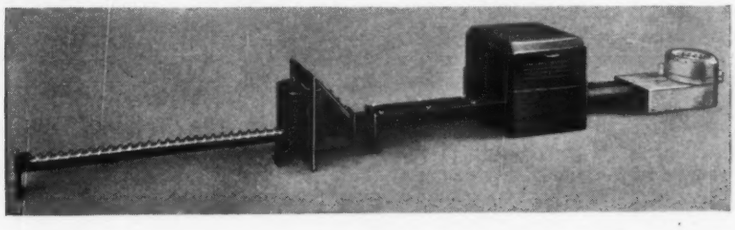
It is a completely equipped, factory-built outfit on sturdy steel skids, with complete canopy enclosure with hinged side panels that fold up over the top and can be padlocked when closed.

◆

7—Bin-Feed Stokers

Conco-Sampsel Stoker Corporation, Mendota, Ill., introduced their new bin-feed stoker recently.

The new model is the result of many months of intensive experimentation and testing. and an important addition to the full line of commercial and domestic stokers.



New Products . . . . . .

For your convenience in obtaining information regarding these items, use the coupon on page 96.

8—Improved Furnace Cleaner

Breuer Electric Manufacturing Company, 852 Blackhawk Street, Chicago, announces an important improvement in their line of tornado portable heavy duty cleaners for removing soot, dust and scale from boilers and furnaces.

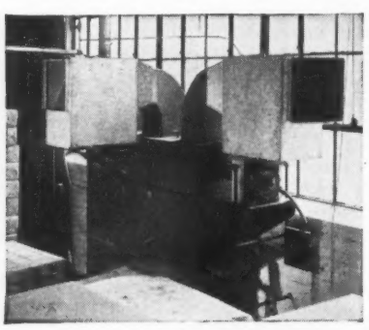
A double size dust bag, a new feature, greatly increases the capacity and reduces backpressure from the exhaust, thus making it possible to maintain suction for longer periods. This improvement insures faster and more thorough cleaning of heating units.

The bag is supported by a rod attached to the fan housing and can be easily removed for cleaning.

◆

9—The Humidity Box

The Air Conditioning Supply Co., 1893 East 55th St., Cleveland, announces The Humidity Box, essentially a high efficiency spray chamber designed primarily for printing shops, to-



bacco and textile mills, but adaptable for supplying moisture to radiator-heated residences.

One unit uses from three to four gallons of water per hour and will evaporate approximately half this quantity, depending upon air and water temperatures, air movement, prevailing humidity condition and humidity requirements.

10—New Pulverizing Burner

Pulvokol, Incorporated, 1122 Hodgson Bldg., Minneapolis, announces "Pulvokol," a powdered coal unit, described as "the atomizing coal burner with controlled firing for higher home heating efficiency." The Pulvokol Heating System is patterned after the oil or gas burner using intermittent spark ignition, thus making claim to a fourth method of domestic heating. Its operation is similar to that of an oil burner except that it uses coal for fuel. The unit pulverizes the cheaper grades of coal, pea-size or smaller, and blows it directly to the combustion chamber. Positive ignition is obtained from a patented burner-head with a high-tension electric spark. Combustion engineers agree that unusual economy results from burning "atomized" or pulverized coal.

Franchise agreements for exclusive territories are being arranged.

◆

11—Bloaire Package Unit

The Lau Blower Company, Dayton, Ohio, is now manufacturing the Bloaire package unit furnace blower, in an attractive streamlined casing rigidly

constructed of heavy gauge steel. The corners are rounded, hardware is chromium and the finish is two-toned baked Morocco.

Filtered air can be taken from the basement for summer cooling.

The mechanism is quiet. Included as standard equipment is an automatic cutout on the motor when subjected to unusually heavy load. Filter frames are constructed to rigidly hold filters and prevent leakage.

◆

12—Transweld

The Lincoln Electric Company, Cleveland, Ohio, announces a new mild steel arc welding electrode, designed particularly for use with small alternating current transformer type arc welders.

"Transweld" has a very heavy extruded coating, a very stable arc, easy to strike and hold.

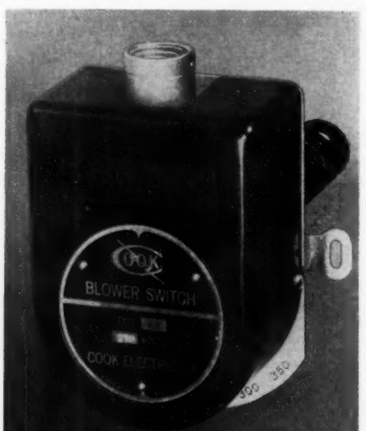
Weld metal produced by the electrode possesses high physical properties. Tensile strength is 75,000 to 85,000 lbs. per sq. in., yield point 60,000 to 68,000 lbs. per sq. in., and ductility 20 to 30 per cent elongation in two inches.

◆

13—New Switches

Cook Electric Company of Chicago, manufacturers of thermostats, furnace limit controls, zone controls and blower controls, announces a complete new line of four warm air furnace switches for fan, blower and limit control at line voltage and low voltage.

The line of new switches comprises two blower switches and limit switches.



The electrical connections on the new Cook furnace switches are made from the top of the control, an important improvement that makes installa-

tion more simple and easy. The range adjusting lever and dial are at the bottom of the control so that it is readily accessible and easily visible. The mounting is simple and controls have an easily adjustable differential.

All of these controls have a range of operation from 100 deg. to 350 deg. Fahrenheit and the differential is adjustable up to 100 deg. Fahrenheit.

ASSOCIATION ACTIVITIES

California

Efforts of the Oakland Furnace Dealers & Sheet Metal Contractors Association of Oakland, Cal., are devoted to offering a united front to the multitude of unions springing up and bargaining with them. The price per hour is now $1.25.

Other efforts are educational and social contacts among the members at three dinner meetings a month, which help in bringing good fellows together and an exchange of helpful advice about credit problems, figuring jobs, etc.

The association has four live wire committees, which are the Furnace Committee, Sheet Metal Committee, Apprentice Committee and the Coordinating Committee.

H. A. Harer, Chairman,
Furnace Committee.

◆

Minneapolis

Quite a number of special meetings of the Minneapolis Warm Air Heating and Air Conditioning Association have been held in the past three months, mostly in the evening in the secretary's office. Some of the meetings have been dinner meetings held in private dining rooms of various hotels, in order to form an opportunity for becoming better acquainted.

Arthur G. Hallgrain, Executive Secretary.

◆

St. Louis

The Associated Sheet Metal, Air Conditioning Contractors Association of St. Louis held an election of officers on December 13, with the following elected:

President	Louis J. Sydow
Vice President	Wm. H. Otten
Secretary	H. Weiss
Treasurer	B. Kolbenschlag
Board Member	Wallace Cavallo
Sergeant at Arms	A. J. Warner

At a board meeting with the board of the St. Louis Heating and Sheet Metal Wholesalers Association, it was decided to hold the regular two meetings a month, the first meeting to be with the Wholesalers Association, who will give lessons on cost of labor and installation of heating jobs on a chart, and the second meeting to be held by the contractors for their business only.

The new officers were installed on Monday evening, January 10, with a speaker and lunch.

The association expects to take in a large number of new members in the next few months.

B. Kolbenschlag,
Treasurer.

◆

Omaha

The Omaha Air Conditioning Council meets the second Friday of each month. The group is composed of dealers who sell, install and service air conditioning equipment. The organization promotes better relations among competitors, and co-operative effort brings results. Activities are confined to advertising and participating in local building and electrical shows.

A set of rules and by-laws was recently constructed and adopted, clearly defining the qualifications for membership. Initiation and membership fee may be charged and future operating and advertising expense is to be borne in greater part by the council.

◆

Buffalo

The Buffalo Air Conditioning and Sheet Metal Association held their regular meeting at Crescent Hall, 264 E. Utica St., with installation of new officers for the year of 1938.

Officers

President	Leo J. Olear
Vice President	William Eisele
Secretary	Fred Frisch
Fin. Secretary	Albert Smith
Treasurer	George Adema

Sergeant At Arms

Frank Heck
Frank Karnath
Walter Schweipert

Board Of Directors

Leo J. Olear	Harry Yost
William Gorden	John Zwelling
Max Reid	John McBride
Fred Frisch	Frank Karnath

Barney Calkins

William Eisele was elected as chairman of all committees.

Educational and Code Committee

Charles Lighthart, Chairman	Bert Ruff
Burt Rodman	John McBride

Entertainment Committee

Max Reid, Chairman	Walter Schweipert
Charles Moore	Byron Cummings
Frank Karnath	Frank Heck

Publicity

Leo J. Olear	Frank Snyder
William Zenner	William Birk

Membership Committee

Kirschgraber, J. M. & L. A. Osborn Co.
Carfer, Wheeling Corrugating Co.
Donaldson, O. G. & D. H. Donaldson Co.
Minet, Minet Supply Co.
Stephens, Barrett Co.
Bennett, Frontier Water & Steam Supply Co.

The selling of automatic heaters to warm air heating contractors by gas companies and wholesale houses was discussed.

A large group of members attended. Max Reid prepared a special plate supper.

The Buffalo Niagara Electric Corporation has given an invitation to use their auditorium for the February 9 meeting, after which there will be a buffet luncheon and a general get together.

Leo J. Olear,
President.

◆

Metropolitan Conference

The Metropolitan Conference of Roofing, Sheet Metal and Air Conditioning Contractors, 446 Lincoln Building, New York City, is sponsoring a convention and exposition to be held on March 29, 30 and 31 at the Hotel Astor, New York City.

Further information and rules and regulations governing space and exhibits may be obtained from James McCawley, Executive Secretary.

Michigan

The Convention dates of the Michigan Sheet Metal & Roofing Contractors Association are March 1, 2 and 3, 1938, at the Durant Hotel, Flint, Michigan.

Frank E. Ederle, Secretary.

◆

Milwaukee

The Master Sheet Metal, Heating, Ventilating and Air Conditioning Contractors Association of Milwaukee elected the following to the Board of Directors to serve one year at the December meeting:

Edward F. Arndt	Frank Kramer
R. H. Fetting	Walter Marth
John Goodwin	Robert Schomann
Angelo Hoffmann	Martin Schaar

A. Walters

The Board of Directors held their monthly meeting December 17 and elected the following officers to serve for one year:

President	Frank Kramer
Vice President	R. Schomann
Treasurer	Walter Marth
Secretary	Angelo Hoffmann
Executive Secretary	Paul L. Biersach

Paul L. Biersach,
Secretary.

◆

Philadelphia

The Association of Roofing, Metal & Heating Engineers of Philadelphia welcome out of town employers when visiting Philadelphia at their association and Heating Class Discussion meetings. The association meeting is the fourth Monday of each month at 8 p. m., and the Heating Discussion Class meetings are held on the first and third Mondays of each month, both at the Builders Exchange rooms, 209 Brown Building, S. E. Corner Fourth & Chestnut Streets.

F. U. Ritter, Secretary.

Western New York

More than seventy members of the Air Conditioning Council of Western New York attended the annual meeting of the organization held December 13 at Buffalo. The principal speaker was Fred W. Zander, of the Crane Company.

New directors announced during the business session are T. L. Anderson, Samuel Ward, J. A. Albrecht, Frederak W. Kendall, Jr., A. E. Stratton and Joseph Davis.

A successor to Louis Harding, recently elected president, who is retiring to give his full time to duties of Commissioner of Public Works, is to be named at the organization's next meeting, Secretary Walter Davis announced.

◆

National Oil Burner Exhibit

A permanent national oil heating exhibit at Radio City, New York, was approved by the board of directors of the Oil Burner Institute at a meeting held recently. The exhibit will be sponsored by the Institute and major oil companies; each group will stand half of the reported yearly cost of $30,000. Plans called for opening the exhibit on January 15, 1938.

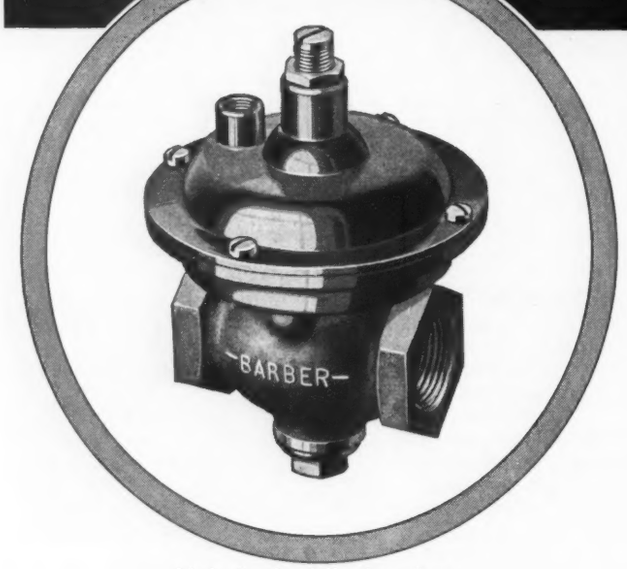
◆

Oil Heat Advertising

The Chicago Oil Heat Committee has started a campaign for a cooperative national advertising campaign for oil heating purposes to be undertaken by responsible oil burner manufacturers and leaders in the oil industry in an effort to maintain the strong position of the oil industry in the heating field.

The Chicago Committee, of which Frank E. Spencer is chairman, asks that a National Oil Heat Committee be formed immediately "to represent fairly and intelligently the oil companies interested in heating oils and the burner manufacturers."

Regulators offer You a Market for More SALES!



Made in the following sizes:
¼", ⅜", ½", ¾", 1", 1¼", 1½", 2".

HEATING contractors and appliance dealers have a rich opportunity to make extra profit on the sale of Gas Pressure Regulators to their regular trade. It takes only a little persuasion to convince your customer of the added fuel economy and safety secured by putting a Regulator on the line or the appliance.

The attractive appearance of BARBER Regulators, harmonizing with modern design in heating equipment, has induced many appliance makers to include them as standard equipment. BARBER Regulators are built to the highest standards of precision, and operate to 3/10 pressure drop. All-bronze body, brass working parts. Sizes ¼" to 1½" tested and certified by A.G.A. Testing Laboratory.

For appliances which you sell, sponsor, or make, let the BARBER Regulator stand as an additional emblem of Quality!

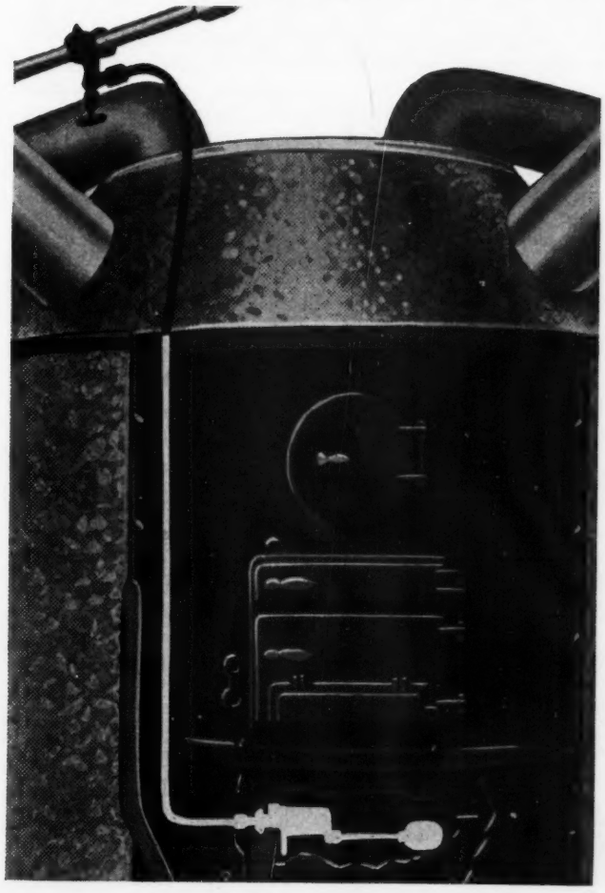
Priced for PROFIT TO YOU! Write for catalog and price list on Barber Burner Units for Gas Appliances, Conversion Burners for Furnaces and Boilers, and Regulators.

THE BARBER GAS BURNER CO. 3704 Superior Avenue, Cleveland, Ohio

BARBER GAS PRESSURE REGULATORS

AUTOMATIC HUMIDITY CONTROL

—INSTALLED IN HALF AN HOUR



Every warm-air furnace in your community is a prospect for the M-VB Humidifier Valve. The simple float-valve keeps the water-pan full at all times, keeps the air in the home supplied with the right amount of moisture for health. It's a great convenience, too. Ends the bother of filling the water-pan by hand.

The M-VB Humidifier Valve is furnished complete with all fittings and tubing in one unit. And it can be installed easily in half an hour without dropping the fire. It's a sure profit-maker you can't afford to overlook.

Ask your wholesaler for information, or write us for an illustrated descriptive booklet.

SCOVILL

SCOVILL MANUFACTURING COMPANY

MORENCY-VAN BUREN DIVISION

STURGIS MICHIGAN

A Complete Line of Closet Tank Fittings

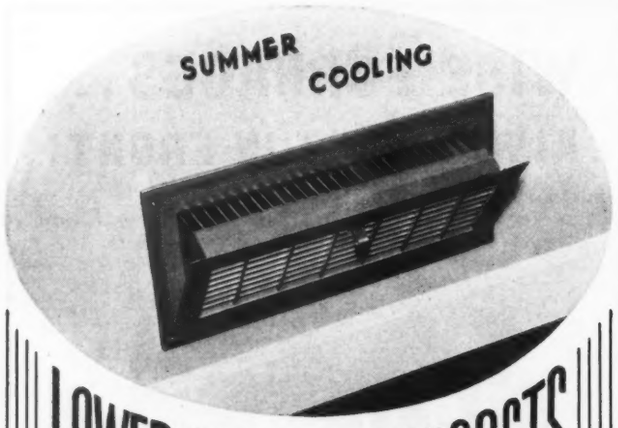
Full Stocks at Sturgis, Waterville, Conn., and San Francisco, Calif.

WISE FURNACES... ALWAYS OUT IN FRONT!

There is a Wise Furnace for every heating need . . . . . large or small. Write today for information on this reliable, reputable line. A post card request is sufficient.

WISE FURNACE COMPANY

Akron Ohio



LOWER INSTALLATION COSTS with the NEW "All Season" Combination A-C Register

PATENTED

The "ALL SEASON" COMBINATION REGISTER reduces installation costs to a minimum on new or change over jobs.

Saves cutting into sidewalls—allows for use of existing duct systems with no changes or additions.

Adjustable grille bars in both warm and cool air faces, provide easily and quickly any air deflection required.

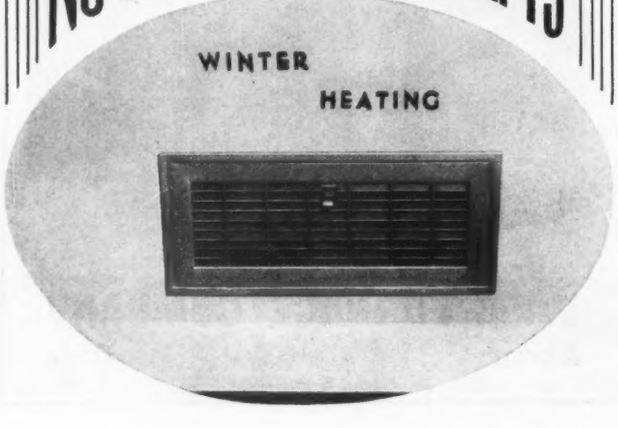
For use on every fan or blower heating installation for partial summer cooling and to provide for future addition of complete mechanical cooling.

Available in both flush wall and baseboard types.

Ask your jobber or write.

ECKENROTH REGISTER CO. INC.
447 SUTTER ST. SAN FRANCISCO. CALIF.

NO OBJECTIONABLE DRAFTS



Ft. Wayne Ordinance

(*Continued from page* 42)

vent the accumulation of vapors in the ash pit, unless the burner is of a type which mechanically purges the ash pit.

c. Boilers and furnaces in which oil burners are installed shall be connected to flues having sufficient draft at all times to assure safe operation of the burner. Smoke pipe dampers, if any, shall be removed or locked in the desired position and shall be such that they cannot close off more than 80 per cent of the internal cross section area of the smoke pipe. All check drafts must be kept closed at all times, or removed.

d. Rooms in which oil burners are located shall be provided with adequate ventilation to assure continuous complete combustion of the oil.

e. Complete instructions for the care and operation of the oil burner equipment shall be conspicuously posted near the oil burner and shall be maintained in readable condition by the user, and there shall be displayed near the heating plant, a card which shall read as follows:

NOTICE: The pipe dampers shall be removed or locked in the desired position and no damper closing off more than 80 per cent of the pipe area shall be allowed. All check drafts must be kept closed at all times, or be removed.

f. Contractors installing industrial oil burner systems shall furnish diagrams showing the main oil lines and controlling valves, one of which shall be posted near the oil burner equipment and another at some point which will be accessible in case of fire at the burners.

Section 67. Modifications: Where the circumstances or conditions of any particular installation are unusual and such as to render the strict application of the provisions of Sections 47 to 68 inclusive of this ordinance impracticable, the Inspector may permit such modifications as will provide a substantially equivalent degree of safety.

Section 68. Fireproofing, When: It shall hereafter be the duty of each licensed installer, when installing a heating plant, to install such fireproofing, adjacent to the smoke pipe thereof, as may be required to comply with the following provisions:

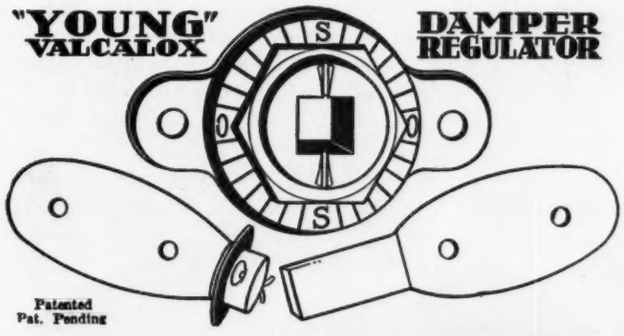
(a) No metal smoke pipe shall pass through any floor or be nearer than 12 inches to any wood or other combustible portion of the building, except as noted below and all combustible material within eighteen (18) inches shall be covered with a metal or asbestos shield extending at least one foot on each side of the smoke pipe and in the case of smoke pipes of a greater diameter than twelve (12) inches and of less area than six (6) square feet, shall be kept at least sixteen (16) inches away from any woodwork, and such woodwork shall be protected as before specified for the smaller smoke pipes, a distance of three (3) feet on each side of such smoke pipes.

(b) Where metal smoke pipes of twelve (12) inches or less in diameter pass through a wood or plastered stud partition they shall be surrounded either by a body of brick, hollow tile, or other incombustible fireproof material of a thickneess of at least four (4) inches around such smoke pipes; or they shall be surrounded by a sheet metal thimble of two (2) concentric rings at least two (2) inches apart, and the entire thimble so constructed that there will be a free circulation of air between the two rings forming the same. Smoke pipes of a diameter of six (6) inches or less may have thimbles with one (1) inch air space; where seven (7) inch or larger smoke pipe is required, same shall be not lighter than No. 24 U. S. Gauge Galvanized iron.

[To be concluded]

They say "IT IS THE PERFECT DAMPER REGULATOR"

The "YOUNG" Valcalox Damper Regulator has been enthusiastically received by the trade. We know it is a superior product but did not realize that the trade would be so enthusiastic about it. The consensus of opinion after using, or even after only examining it, is —"It is the PERFECT Damper Regulator." If you will check the 16 points shown below you will realize its unusual merit. Remember,—the 231 serrations on the side of dial and also 231 serrations on base POSITIVELY PREVENT SLIPPING. Ask your Jobber—do not take our word—better still, use on your next job.



5/16" square rod Regulators are 16c each—with bearings, rivets, and screws, 22c each. Net trade prices. Also made in 3/8" size. Come packed twelve in a box with one wrench.

16¢ AND 22¢ Each

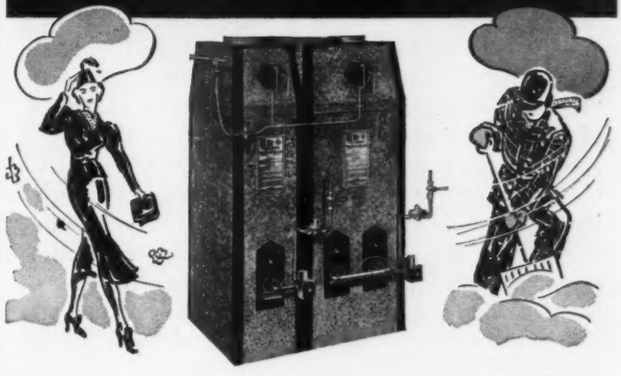
CHECK THESE 16 POINTS

1. 231 Serrations on Side of Dial, Corresponding to those on Base—POSITIVELY Prevents Slipping of Damper
2. Holds Small or Large Dampers
3. Sleeve to Receive either Bearing or Bar
4. Locks Securely
5. Positive Action
6. Indicates Position of Damper at ALL Times
7. Placed on Bearing or Bar with Pressed Fit—NO VIBRATION
8. Can be Placed on Partition Wall or ANY Location of Duct
9. Can be Placed on ALL Styles of Dampers
10. Bearings Permit Easy Installation of Dampers in Small Ducts
11. Rotates 360 Degrees
12. No Thumb Screws to Become Loose
13. Base is Zinc Alloy—Eliminates Corrosion on Movable Parts
14. All Parts, with Exception of Base, are Cadmium Plated
15. Damper is Rotated with Special Wrench Placed on End of Bearing or Bar
16. The Hex Nut is Locked or Released by Using the Opposite End of the Operating Wrench

Ask Your Jobber or Write

YOUNG REGULATOR COMPANY
4500 Euclid Avenue **Cleveland, Ohio**

Built for a BREEZE or a BLIZZARD



Weather changes hold no terrors in the home heated by a Payne Series "A" (Unit) Furnace.

This superb furnace permits "zoned" heating. Control is selective. The whole house may be heated at one time—or any portion of it—at any desired temperature.

At the touch of a button the Payne Series "A" goes into operation . . . provides warm, pure, circulating air wherever it is wanted. Completely automatic with thermostat control.

Builders are invited to write for full information about the Payne Series "A" Furnace and other members of the Payne line.

PAYNE FURNACE & SUPPLY CO., INC.
Beverly Hills, California

Payne

Warm Air Meeting

(*Continued from page* 31)

year's school will be divided into three groups; the elementary heating group, advanced heating group, and cooling group; but that arrangements will be made so that for the lectures, students may pass from one group to another in order to get the utmost value from the course. In these lectures an attempt will be made to include more general information such as use of the degree-day tables, filters, combustion, soil temperatures, insulation, register location, controls, and other vital problems of the 1938 season.

The Filtering of Air

H. E. Birkholz of American Air Filter Company, Louisville, Kentucky, speaking on the subject of "Filtration of Air," traced the history of the study of filtration of air-borne particles and by the use of suitable slides showed the comparative sizes of particles commonly found in air. The speaker also indicated to some extent typical percentages of impurities in air and traced the history of different types of filters from the earliest use of filters in industrial processes up to the present wide application in all types of air-handling devices. This material is of such general interest that excerpts from the paper will be printed in a forthcoming issue of American Artisan.

How Much Is a Furnace Worth?

F. E. Mehrings of Meyer Furnace Company, Peoria, Illinois, speaking on "Meeting Outside Competition or Comparative Values" declared that the purpose of his talk was to point out to furnace contractors and manufacturers just how valuable the present-day winter air conditioning system really is by comparing prices of widely accepted household equipment with winter-air conditioning systems.

"If we concede that a good electric washer sells for $80; that a good washer will wash one tubful of clothes clean in 6 minutes; is in actual use about 2½ hours a week or 130 hours a year; that this washing machine will last for 25 years, we have 3,250 hours of service for $80—therefore a furnace which keeps your house comfortable eight months out of the year or approximately 145,000 hours in twenty-five years should be worth at least $3,600. If a good automobile costs $1,000 and lasts ten years and during each week in these ten years the automobile is used by one or more members of the family twenty-one hours (3 hours every day) and if the automobile averages 20 miles per hour we have 21,840 miles in a year, or 10,920 hours in ten years. On the same basis for the furnace as mentioned under the washing machine, arithmetic shows that a fair price for a furnace would be close to thirteen times $1,000 or $13,000 for the ten year period and for the twenty-five years of furnace life, $32,500.

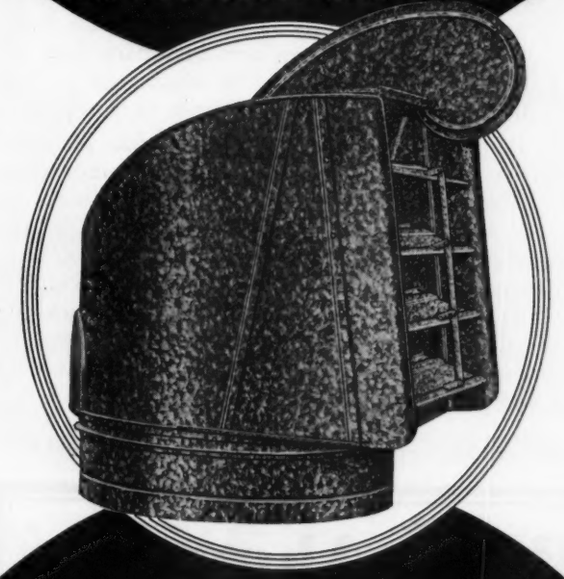
"If a vacuum cleaner which will keep your house clean for $69 has a service life of 25 years and is

valves
controls...
are
DEPENDABLE

AUTOMATIC PRODUCTS COMPANY
2452 NORTH 32ND ST. MILWAUKEE, WISCONSIN

Expansion Valves . . . Solenoids . . . for Refrigerants . . . Gas . . . Water . . . Oil
Available in all Capacities
For Your 1938 Catalogue . . . Sales Plans . . . New Products . . . New Installations

When Ventilation Conditions are *Tough*— Requirements *Exacting*— and Customers *Particular*— *Here's the answer for both the customer and YOU!*



The NEW **Swartwout ROTARY** *BALL BEARING* **VENTILATOR**

● Newly improved design and construction — greater capacity — more dependable than ever — pleasing, modern appearance — backed by a 27 year record of outstanding successful performance.

Attractive discount to Sheet Metal Contractors — write for prices and full information.

THE SWARTWOUT COMPANY
18615 EUCLID AVENUE, CLEVELAND, OHIO

MONCRIEF *winter* **AIR CONDITIONERS**

Give You the Best of Sales Points

Take on the Moncrief line of winter air conditioners this season and you will be equipped as never before to do the air conditioning business in your community. In the very complete Moncrief line you have units specially designed to burn any fuel, in sizes for every need. All are right up-to-the-minute in style and finish, scientifically engineered, including every feature that will produce finer winter comfort at lower cost and with greater convenience. And, not least, you will find Moncrief prices enable you to meet competition on favorable terms with profit to yourself.

★

Write for new literature and all the details of the profit-making Moncrief Proposition

THE HENRY FURNACE & FOUNDRY CO.
3473 E. 49th ST. • CLEVELAND, OHIO

used two full hours a week, this vacuum cleaner would be in actual use 2,600 hours and a fair price for a furnace compared with the service life of an electric vacuum cleaner would, therefore, be $3,864.

"If the ever popular radio costs $90 and if this radio averages eight hours a day, day in and day out, and will last for ten years, we have $90 multiplied by two and a half for 25 years and the total cost is $225. A furnace on the same basis as mentioned for the vacuum cleaner would be worth at least $450.

"If a reasonably good piano cost $300 and lasts twenty-five years, and day in and day out is put to actual use one full hour per day, a furnace on our basis of comparison should be worth a fair price of $4,800."

◆

Measuring Air Volumes

(*Continued from page* 59)

In order to obtain the average velocity of the air issuing from a register opening a traverse should be made with the anemometer placed successively in the center of a number of equally divided areas. For the purpose of facilitating the process of making measurements the instrument may be slowly moved over the face of the grille.

The formulas as derived by Prof. Davies were claimed to "give results accurate to within plus 5 per cent or minus 5 per cent." It is probable that the results apply only to cast or perforated grilles.

Later work as reported by Prof. G. L. Tuve ("Measuring Air Distribution and Grille Performance in Air Conditioning," A.S.H.V.E. Journal, November 1937 pp. 700-702) has indicated that formulas (2) and (3) may give results considerably in error when applied to straight-forward flow, low resistance type of grille. ("The assembled steel-strip grille, with strips edgewise in the stream, does show a lower air resistance than most of the perforated or cast designs"). The formula as proposed for the capacity of a low-resistance, straight-flow grille is:

$$C.\ f.\ m. = C\,A\,V \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

in which,

V = velocity in feet per minute
A = free-open area in square feet
C = coefficient of discharge = 0.77 (probable accuracy + 5 per cent)

It should be recognized that the results obtained with an anemometer, or similar velocity indicating meter, are subject to large errors, that are inherent in the instrument, in the calibration, and in the application of the instrument. In many cases, however, it is the only instrument that is available for field application work. The use, application, and care of such measuring instruments should be familiar to all who are interested in determining the performance of forced-air plants.

Something to Blow About!

BLO-ETTE

THE 1,000 C.F.M. PACKAGE UNIT FURNACE BLOWER

Model 401

Less than $40.

A sensation at the Exposition! A centrifugal type blower (not a fan) that will meet the requirements of thousands of homes. 1,000 C.F.M.—large enough to remedy the many thousands of unsatisfactory gravity jobs now installed, *at a low cost.* Blo-ette opens a new field of blower sales for *you*!

A Complete Blower

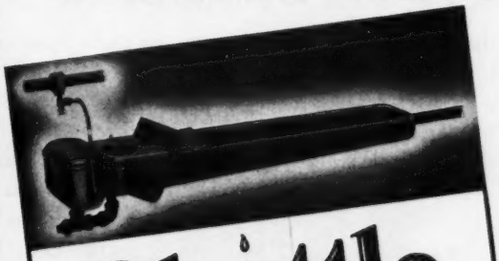
Including Motor, Filters, Blower Cabinet, Blower and Full Size Access Door. Beautiful two-tone baked Morocco finish with chrome trim. Automatic cut-out on motor, included as standard equipment. Blo-ette is also sold less casing, filters and motor.

Write now for complete data and prices.

The Lau Blower Company

Dayton, Ohio

SKUTTLE AUTOMATIC HUMIDIFIERS



Skuttle
AUTOMATIC HUMIDIFIERS

- Promote Better Health
- Prolong Life of Furnishings
- Quickly Installed
- All Working Parts are Brass or Copper
- Water Supply Is Automatic
- Water Valve Located Outside Furnace
- Accurate Regulation
- Silent Operation
- Proved Economy

Twenty Years Experience in Humidification

RING *New Profits* FOR DEALERS.....

Skuttle Humidifiers . . . for warm air and radiator heating systems . . . give home owners greater health . . . comfort . . . and convenience. They automatically moisten heated air to a practical, healthy degree. Skuttle helps you sell hundreds of prospects in your district. Puts profits into your pockets.

TIE-IN . . . AND CASH-IN . . . ON SKUTTLE

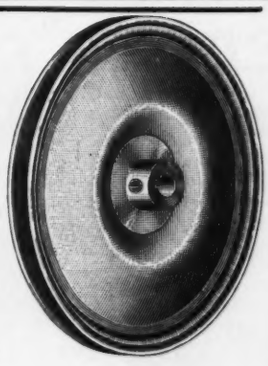
NOTE TO REPUTABLE DEALERS
PROFITABLE FRANCHISES STILL OPEN
WRITE FOR INFORMATION TODAY

FREE

J. L. SKUTTLE CO., 999 FRANKLIN STREET, DETROIT, MICH.

MAUREY
STEEL V-PULLEYS

Specially Designed for High Efficiency Operation with STOKERS, BLOWERS, FANS, REFRIGERATION, AIR CONDITIONING and Other Domestic Units



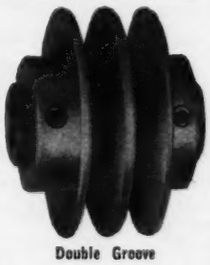
Balanced, true running and quiet at all speeds. Built to give long trouble-free service under severest use. Made with heavy rolled steel edges and SOLID STEEL or malleable iron hubs, machined. Carried in stock for "A" and "B" belts, in a wide variety of sizes. With DOUBLE GROOVE as well as single groove.

No Die Cast Hubs Used in MAUREY Pulleys.

MAUREY Variable Pitch Diameter Pulleys

Single Groove

Solid steel construction. Adjustment permits speed variation of as much as 30%. Designed for Air Conditioning Units. Solid steel—not die cast. Made in 4 sizes, 3¼" to 4½ inches in diameter.



Double Groove

MAUREY MANUFACTURING CORP.
Wabash at 29th Chicago, Ill.

Announcing

New GOLDEN ROD UTILITY BLOWER

Now available in a complete range of sizes from 9" to 24", either complete assemblies or as separate housings and wheels. For all Air Conditioning applications requiring from 500 to 20,000 C.F.M.

Contact your nearest Golden Rod distributor—or write direct to factory.

F. JADEN MFG. CO. INC. Hastings, Nebr.

Manufacturers of:

Package Blowers
Utility Blowers
Twin Blowers
Blower Wheels
Blower Housings
Blower Bearings
Unit Coolers
Unit Heaters
Central Air Conditioners
Unit Air Conditioners
Humidifiers

NEW IN DESIGN— CONSTRUCTION —PERFORMANCE

COOK WARM AIR FURNACE SWITCHES
for
FAN, BLOWER & LIMIT CONTROL

THE new Cook furnace switches will meet the most exacting requirements of the men who depend on them for efficient operation of their heating plants—and of you who sell and install them.

Greater convenience is provided by these new switches. The scale and lever are at the bottom of the case where they are easily seen and adjusted. The line voltage models have a BX or conduit connector fixed to the top plate of the switch and terminals so placed as to make connection easier than ever before. All exposed metal parts are finished in satin cadmium and the cover is fine black bakelite.

You can sell the new Cook Switches with confidence that your customers will always be satisfied with their performance. You'll be interested in detailed specifications. Write today.

COOK CONTROLS

THERMOSTATS—FURNACE LIMIT CONTROLS
ZONE CONTROLS—BLOWER CONTROLS

COOK ELECTRIC CO.

2672 Southport Ave. CHICAGO

Precalculated Engineering

(*Continued from page* 47)

in Table No. 8. The three items of heat loss—exposed wall, glass and ceiling show a total of 5.8 which is for an inside-outside temperature difference of 70 degrees, but this is a bath room where an 80-degree room air temperature is desirable. Allowing 1.5% per degree above 70 as the addition to be made, a 10-degree higher room air temperature would require $10 \times 1.5\% = 15\%$ increase in the estimated heat loss. 15% of 5.8 is 0.9 and $5.8 + 0.9 = 6.7$ which is the "corrected" heat loss entered on the data sheet.

This "1.5% per degree allowance" is a close approximation and is in accordance with the provisions of the Standard Code. In a later article a conversion table will be given which will be a little more accurate, but the principal advantage of the table will be convenience rather than accuracy. It will show comparative heat losses at a glance and without the trouble of figuring percentages of addition or deduction.

The data shown for room 201 probably needs no explanation except for the second cold ceiling item. The 14 x 14 item is of course the ceiling proper. The 5 x 8 item is for that part of the inside partition which separates this room from the unheated attic space. Usually such partitions are of frame construction with lath and plaster *on only one side* of the studding in which respect they are responsible for as much heat loss as a similar area of lath and plaster ceiling without insulation or tight floor above. In estimating heat losses such cold partitions should therefore be treated the same as ceiling.

The method suggested for using these precalculated tables in estimating heat losses are in no sense an experiment. These and similar tables are regularly used by experienced and successful heating men for determining requirements of both gravity and forced air systems.

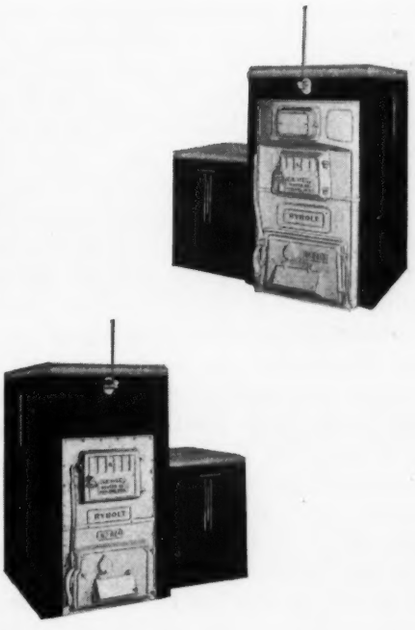
◆

Second Floor Returns

(*Continued from page* 52)

densation on windows is reduced and often entirely eliminated by the use of double windows; thereby permitting the carrying of higher indoor humidity conditions in cold weather. Single windows frequently cause excessive condensation below 35 degrees outside temperatures; unless the indoor humidity is carried at a point much lower than is called for by proper standards of health. The Crandall residence reacted in just this manner before the installation of the double windows. Now proper humidities can be carried at all times; with resultant benefit to all members of the family.

SPRING IS ON ITS WAY!



. . . and coming with it is a lot of repair work for you heating and air conditioning men. Those furnaces in your prospects' homes will have taken quite a beating by spring and you'll find many that need a good going over. . . . In some places you'll find they've given up the ghost entirely. Get into those basements NOW! Show the home owner where the repairs needed will add up to a tidy sum . . . and you'll start him thinking in terms that will mean a profitable installation for you. Start the year right. *Go after those jobs now* . . . and when you get them specify and install Rybolts for big profits. Write today for further information.

The RYBOLT HEATER COMPANY, Ashland, Ohio

You'll Speed Up Your Work With NIAGARA FOOT GAP SHEARS

1. Easy Operation
2. 16 Gage Capacity—36" to 72" cutting lengths
3. 18" Gap
4. Modern Closed Panel Housings
5. Self Locking Steel Hold-Down
6. Visible Cutting Line
7. Steel Cross Head
8. Tubular Treadle Mechanism
9. Niagara Alloy Steel Knives
10. Complete with gages.

A Complete Line of Machines for Your Sheet Metal Shop

NIAGARA

Folders—Brakes
Groovers—Seamers
Slip Roll Formers
Power Presses

Shears, Squaring, Rotary Lever Shears—Punches
Machines for Turning, Wiring, Beading, Burring, Flanging

Write for Bulletins.

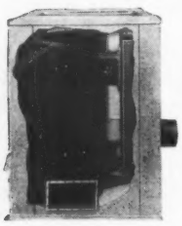
NIAGARA MACHINE & TOOL WORKS
683 Northland Avenue Buffalo, N. Y.

MORE VOLUME
MORE PROFITS
CADILLAC *Gives You* BOTH

● If you want to increase your volume sales and get in on a real profit line, don't fail to find out about the CADILLAC line today, the furnaces that are priced right to sell right! Many years of furnace building backs up every sale with a guarantee of the best in construction and operation.

● Boiler plate steel is used to build the DOUBLE SEAL DRUM or combustion chamber, and all seams are lapped and welded inside and out, eliminating all possible leakage of gases. The radiator is built of 12-gauge steel, while the casing is made of 20-gauge auto body material in baked red crinkle finish. The grates are made to resist the intense heat of hard coal or coke. The blower is mounted on rubber-cushioned bearings and is driven by a long-hour motor.

STOKER *or* OIL MODELS



MODELS

LEFT — STOKER MODEL C. S.

RIGHT—OIL-BURNING MODEL C. O.

The Cadillac Stoker-Fired Unit is the only furnace on the market that lends itself to the easy adaptation of the stoker.

The Cadillac Oil-Burning model is designed for the easy installation of either the gun-type or rotary burner.

Live territories open to distributors and dealers throughout the country. We invite your inquiry.

MICHIGAN TANK & FURNACE CORP.
14101 Prairie Avenue, Detroit

Michigan Tank & Furnace Corp.
14101 Prairie Ave.
Detroit, Mich.
Gentlemen:
Please send complete information on the CADILLAC line of furnaces.
Name_____
Street_____
City_____ State_____

Motors in Air Conditioning

(*Continued from page* 64)

The normal torque, normal starting current, squirrel cage motor, in the sizes ordinarily encountered on residential air conditioning would have sufficiently high starting and pullout torque to be suitable for the operation of any piece of apparatus encountered.

It has, however, a large current inrush at the time of starting and the starting current power factor is relatively low. In those few cases, where the public utility furnishing the current demands current limiting starting equipment, the starting torque is reduced considerably. Because of the small size of the motor for residential jobs this problem is practically eliminated.

The normal torque, low starting current motor, is available in sizes 7½ HP and larger, only, and would not generally be found on residential work. In those remote cases where it is encountered, it should be remembered that the torque values are usually somewhat below the ordinary normal torque, normal current motor, but the starting current when the motor is thrown directly across the line is within the recommended EEI limits up to 30 HP.

The high torque, low starting current, squirrel cage motor, is available in sizes 5 HP and larger and may be expected occasionally on residential work. However, where it is available, it should be remembered that the starting torque is approximately 25 to 50% greater than the normal torque motor on full voltage starting and with a starting current approximately 10% less and within EEI limits.

All types of squirrel cage motors are available in 1, 2, 3, or 4 speed designs with variable torque or constant torque characteristics.

There is also a constant horsepower motor (the same horsepower on all speeds) but it does not enter into air conditioning applications and must be avoided.

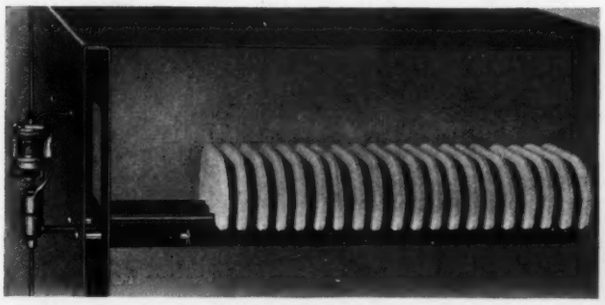
The 2 speed motors may be either single winding or two winding. The 3 speed motors ordinarily have two windings, but some have four windings. The extra cost of 3 or 4 winding motors cannot be justified on any but the de luxe job.

The variable torque motors are used exclusively for the operation of fans and blowers. The constant torque motors are used only for the operation of refrigeration compressors.

Automatic Start Induction

This motor has two windings on the rotor. One winding is a high resistance squirrel cage construction and gives a high starting torque—about 250%—together with corresponding low starting current. A centrifugal mechanism within the motor switches into service the low resistance winding when the motor approaches full load speed. In this manner the motor has a starting torque equal to a high torque motor and still has the advantage of run-

AUTOMATIC JUNE
HYDRO-METRIC HUMIDIFYING SYSTEMS



Newly Designed Basement Control Unit

BIGGER and BETTER BUSINESS

for you in 1938

In every heating plant you are called on to examine, with scarcely an exception you find either an inadequate or an out-moded humidifier. What a business opportunity every such occasion presents to the dealer who understands the requirements of modern humidification—who understands the great benefits which an Automatic June Hydro-Metric Humidifying System alone affords. Best of all, the market has been prepared for you to realize on. Home owners really want good humidification—the kind that Automatic June gives, with none of the disabilities and deficiencies that have often accompanied humidifiers in the past.

Automatic June applies a new principle in humidification. It is a complete system that provides ample humidification in mild weather, and in forced air systems where bonnet temperatures are low . . . In severe weather it limits evaporation and does away with "weeping" windows . . . Extremely small area of evaporator does not impede air flow . . . Will not clog . . . Easy to install.

Write today for particulars of the Automatic June Proposition.

MONMOUTH PRODUCTS CO.
1933 East 61st St., Cleveland, Ohio

It's Combustioneer
AUTOMATIC COAL BURNER
THE LEADER—ALL THE WAY

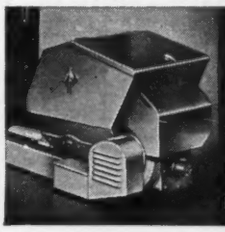
On every count the decision goes to Combustioneer as it puts the Kayo on competition and leads all the way in the field of Automatic Coal Heating.

IT'S *Combustioneer*—THE PIONEER
1 *Proved* engineering—research—and complete manufacturing and testing facilities *under one roof* protect your reputation.

IT'S *Combustioneer*—THE PRECISION-BUILT
2 Highest standards of precision-built manufacture insure dependable and economical operation.

IT'S *Combustioneer*—THE SALES LEADER
3 Nine *exclusive* and demonstrable construction and convenience features give you unquestioned sales leadership.

IT'S *Combustioneer*—THE PROFIT MAKER
4 Sound price and discount structure, powerful sales plans and national advertising assure you bigger, quicker profits. Write for details to Combustioneer, Springfield, Ohio.



Combustioneer
AUTOMATIC COAL BURNER
FOR HOMES, APARTMENTS AND FACTORIES
DIVISION OF THE STEEL PRODUCTS ENGINEERING CO.

3 TYPES OF ALLEN Turbine Ventilators for 3 Important Jobs!

1. MULTI-VANE. The famous "Free Air" Allen Ventilator which gives cost-free powerful suction, and is the standard installation for most ventilating jobs.

2. ELECTRO-WIND. Air plus power. The same Multi-Vane ventilator, with auxiliary electric power available to double the exhaust at a trip of the switch.

3. TYPE "C." The vane-less Allen, especially designed for chimney jobs or any ventilation project where lowest cost is demanded.

ILLUSTRATING MULTI-VANES

Our engineering department will assist you if desired. Let us send the latest literature on all types, for your files.

The ALLEN Corporation

9752 ERWIN AVENUE DETROIT, MICH.

MAIL THIS COUPON!

AIR CONTROLS, INC.
Div. of The Cleveland Heater Co.
1933 West 114th, Cleveland, Ohio

Name .....
Company ..... State.....
City.....

Get the Full Story on the

New 1938 REX AIR-PAK BLOWER FILTER UNIT

with Automatic Modulated Control

The new REX AIR-PAK offers dealers the biggest selling advantage in the 1938 blower filter unit field. Modulated control can provide a complete furnace control system. Ride to big profits in 1938! Get the complete Modulated story now!

ning characteristics of the squirrel cage induction motor. The starting current power factor is high. This motor, built in sizes down to ½ HP, is advantageous in residential work where heavy starting currents and the corresponding voltage fluctuations are objectionable; the low starting currents holding these disturbances to a minimum.

Slip Ring or Wound Rotor Motors

These motors are built for both constant speed and variable speed service and are mentioned here because of their availability for the unusual installation. They are built down to ½ HP and sometimes smaller, but the cost is out of proportion to the advantages for the residential job.

Synchronous Motors

Synchronous motors would never be used on residential applications.

Direct Current Motors

There are three types of direct current motors available as follows:

1. Shunt wound.
2. Compound wound.
3. Series wound.

Of these three types only the first two are used for air conditioning service.

Shunt Wound Motors

Shunt wound motors are not generally used in the fractional sizes, but are sometimes used in the integral sizes. Where they are used they are considered as being applicable to fans, centrifugal pumps, or other equipment of a similar nature where the starting torque required is relatively small. They should not be used on reciprocating pumps or compressors, excepting where the equipment is started unloaded.

Compound Wound Motors

This is the type of motor used in practically all applications of fractional horsepower ratings. They are more generally used, also, in the smaller integral ratings and in each case are suitable for pumps, stokers, refrigeration compressors, or any application where high starting torque is necessary, or where frequent starting, particularly as encountered in automatically controlled jobs, is a necessary feature of operation.

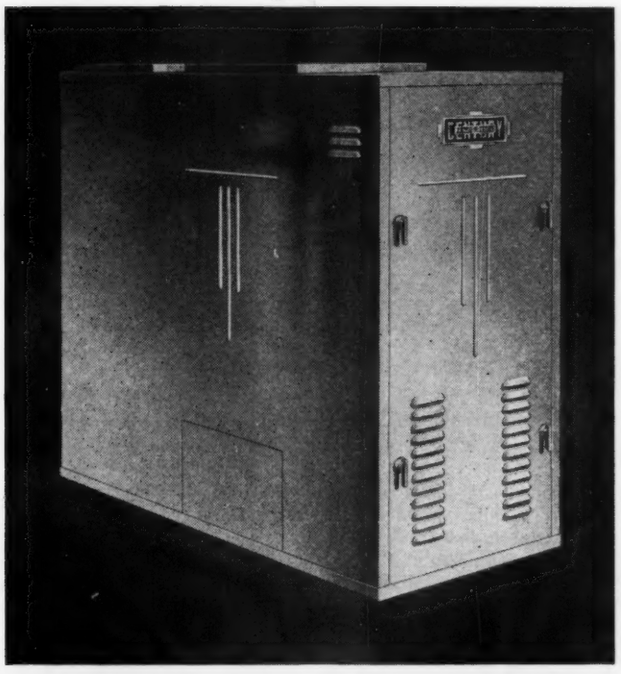
Series Wound Motors

Series wound motors would find no regular application in a household air conditioning job and are recorded here only to answer that question.

Direct current installations on residential jobs are comparatively few. It should be remembered, however, that any job for which a suitable alternating current motor can be found may be motored with direct current motors as easy or even more so.

The problems of application will be discussed separately in paragraphs to follow.

CENTURY Sweeps On!



ZEPH-O-LATOR Sells FAST!

Everywhere warm air heating men acclaim Zeph-O-Lator . . . Century's sensational warm air furnace unit with winter air conditioning. Its amazing performance . . . better than 85% overall efficiency in accurate, unbiased tests . . . its striking appearance, and compact structure . . . all win instant approval. And in thousands of homes Zeph-O-Lator is setting a new high in comfort, convenience, economical heating and 100% satisfaction!

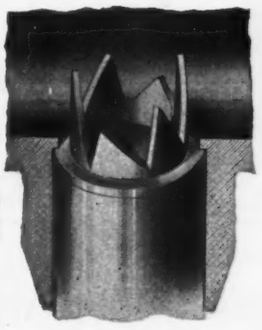
Naturally only outstanding engineering could account for such superior performance. Until you see Zeph-O-Lator . . . study its utterly different design for both heating and air conditioning . . . you can't appreciate how much advanced it is over other makes! So to-day . . . write for complete details, the astonishing performance data, and the remarkably reasonable price. Also ask about Century Conversion Burners; Zone-Master, a radically new type Flueless Boiler-Burner; and Century Hot Water Heaters. The CENTURY ENGINEERING CORP., Cedar Rapids, Iowa.

CENTURY

Conversion Burners Boiler-Burner Units Warm Air Furnace Units with Air Conditioning Hot Water Heaters

...AND DON'T FORGET THE SPECIAL FEATURES OF

AEROFIN Heat Exchange Surface



CROWN ORIFICE

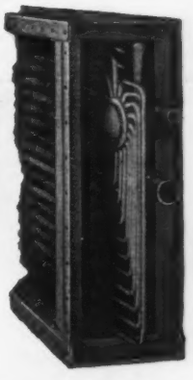
For Flexitube Heating Units

This patented orifice having sharp projecting points is assembled in each tube to break up scale carried along in the steam line and to stop clogging. Danger of freezing due to faulty distribution of steam is thus eliminated.

CENTRIFUGAL HEADER

For Direct Expansion Units

This patented centrifugal header, a product of extensive research and field tests, saves costs on installation, is simple, fool-proof and properly distributes the refrigerant through all circuits of the coil.



CLEANABLE TUBE UNITS WITH REMOVABLE HEADERS

For Water Cooling

The headers being removable permit easy cleaning of tube interiors. They are particularly valuable when sediment or scale-forming chemicals are present in the cooling water.

Special features such as these are present in all Aerofin heat exchange surface, making it the logical choice of engineers, architects and air conditioning contractors. ***Send for technical literature or consult any of our district offices, shown below, for the solution of your particular problem.***

AEROFIN is sold only by Manufacturers of Nationally Advertised Fan System Apparatus. — List upon Request

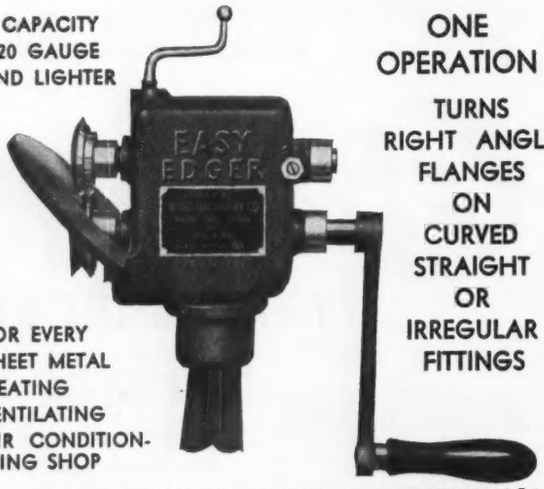
AEROFIN CORPORATION
410 SOUTH GEDDES STREET
SYRACUSE, N. Y.
Chicago • Detroit • New York • Philadelphia • Dallas • Atlanta

THE EASY EDGER

A FLANGING MACHINE THAT FLANGES IN—

CAPACITY 20 GAUGE AND LIGHTER

ONE OPERATION



TURNS RIGHT ANGLE FLANGES ON CURVED STRAIGHT OR IRREGULAR FITTINGS

FOR EVERY SHEET METAL HEATING VENTILATING AIR CONDITIONING SHOP

NOTE—WILL TURN ONE HEIGHT FLANGE ONLY ($\frac{7}{32}$)

MORE SIMPLE THAN A BURRING MACHINE	NO GAUGES TO ADJUST	SPEEDY ACCURATE UNIFORM EDGES

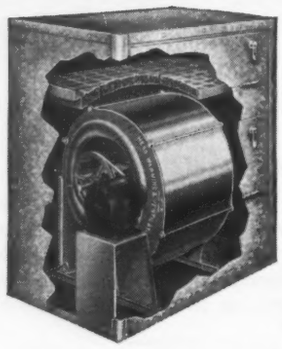
WRITE FOR DETAILS

WARD MACHINERY COMPANY

564 W. WASHINGTON BLVD.

CHICAGO ILLINOIS

QUALITY EQUIPMENT-- FROM HESS-- COSTS LESS



DEALERS

WRITE FOR FREE HESS SALES PLAN TO INCREASE WINTER BUSINESS

—

The Hess Line is complete for every dealer requirement.

The Hess Blower Filter is priced low and is completely factory assembled, ready for connection to any furnace. Two large hinged doors for easy access, motor high off floor, sturdy construction, quiet operation, galvanized or enameled casing and other features, give you unequalled value and performance. Hess Furnaces, oil burners and stokers give you greatest values at lowest prices.

WRITE FOR DEALER PORTFOLIO

HESS WARMING & VENTILATING CO.

1211-27 S. WESTERN AVE. Founded 1873

CHICAGO, ILLINOIS

News Items . . . . . .

G. G. Ray in Atlanta

G. G. Ray and Company, formerly of Charlotte, N. C., announces the re-establishment of the old firm at 588 Peachtree street, N. E., Atlanta, Ga. In addition to a complete line of air conditioning and heating equipment, the concern plans to represent roofing and sheet metal lines, oil burners, stokers, oil-fired furnaces, coal fired furnaces, and heating equipment.

The sales force includes Lee Holmes and Ralph Morgan.

◆

Pre-Inventory Sale

Memphis Fence and Roofing Co., 46 West Virginia avenue, Memphis, Tennessee.—Julius Fulenwider, general manager —was staging an annual inventory sale in the last days of the old year December 27 to 31. Corrugated steel roofing was among the features. In the 1937 season the company enjoyed a very good trade on roofing for farmhouses, barns, etc. They also staged a number of radio programs and distributed considerable printed propaganda on the products it distributes.

◆

Mark Moves

H. J. Mark, exclusive distributor for the Auburn Automobile Co., Air Conditioning Division, in the eastern section of Pennsylvania, Southern New Jersey and Delaware, has recently moved to the Terminal Commerce Building, 401 N. Broad street, Philadelphia, Pa.

◆

Sells Strictly to the Trade

State Supply Co., 1273 E. 123rd street, Cleveland, will sell strictly to the trade and will handle furnaces, sheet metal and roofing supplies. Carl Kanner, formerly of Ohio Sanitary Specialty Co. and William Looney, formerly of Forest City Foundries, will be very active in the management.

◆

Cole Plans Expansion

Cole Radio Supply Company, distributors, 221 West Fourth street, Austin, Tex., is expanding and taking on a number of heating and cooling appliances. The plans are to expand the wholesale business in the 75-mile radius of Austin.

◆

Social Security Returns

Secretary Morgenthau announced recently that after January 1, 1938, monthly tax returns under Title VIII of the Social Security Act will no longer be required, but instead tax returns are to be made and taxes are to be paid on a quarterly basis. This change provides also that information returns listing employees to whom wages have been paid and the amount paid to them are to be combined in one form with the tax returns.

After January 1, 1938, however, each employer liable for the payment of taxes under Title VIII will be required to make only a single return on Form SS-1a in place of the monthly tax return and the quarterly information return now required by the regulations.

◆

Obituary

Theodore Borgwald, 65, St. Louis sheet metal man for fifty years, died Jan. 3, at Sand Springs, Okla., where he had resided for several years. Before moving to Oklahoma he resided at 2310 Cherokee street, St. Louis, Mo. He is survived by his wife, two sons, Fred T. and Charles, and a sister.

◆

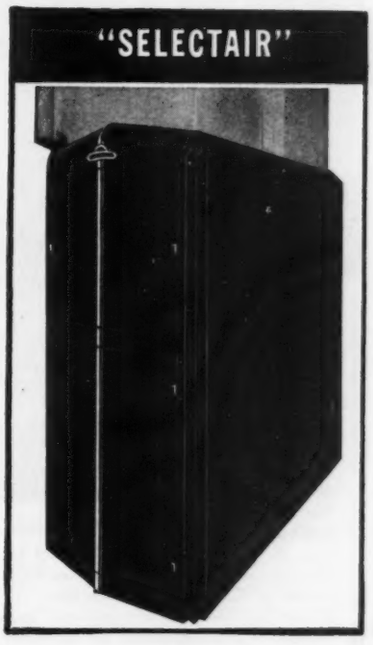
John M. Robb, a heating contractor of Minneapolis, Minn., for the past 25 years, died recently at the age of 51. He is survived by his wife, six brothers and four sisters.

◆

Henry J. Rump, aged 71, a hardware dealer and sheet metal worker of Fremont, Neb., died recently following a long illness. He is survived by his wife, four sons and three daughters.

MODERN HOMES ARE AIR-CONDITIONED BY

SELECTAIR



● DESIGNED and built by the S. T. Johnson Co., pioneer manufacturers of Oil Burners, this smart new air-conditioner combines in one compact unit every feature desired by home-owners, architects and engineers for economical heating, air-conditioning & ventilating the modern home. Year-'round hot water. Forced air circulation for summer. Equipped with the popular BANKHEAT Pressure-Type Burner. Furnished in enamel with chrome trim.

Send for "SELECTAIR" *Bulletin and complete specifications*

MEMBER OBI OIL BURNER INSTITUTE

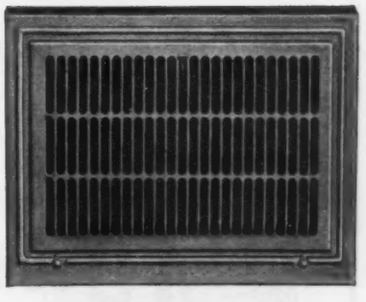
S.T. JOHNSON CO.

940 ARLINGTON, OAKLAND, CALIFORNIA
401 N. BROAD ST., PHILADELPHIA, PA.

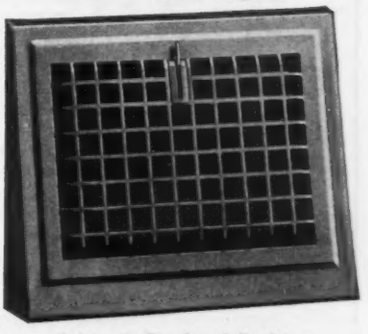
● THERE'S A JOHNSON FUEL OIL BURNER FOR EVERY PURPOSE

What is the Price of a CHEAP Register?

Registers for Gravity Heating need not be cheap "tinny" affairs. Into AUER Gravity Registers are put the care in design, substantial materials, expert workmanship, and fine finish that go into *every* AUER product—gravity or air conditioning. Operating device is made so that it will work easily and stay put *after* the paint wears off. Every feature is included for an easy, perfect fit to wall, baseboard, or floor. These things *count*. Often they make or break a *customer*. Play safe! — with AUER Registers, which, after all, cost no more than *any* ordinary register. Complete Catalog of Registers, Cold Air Faces, and Grilles on request.



Elite Two-Piece Register

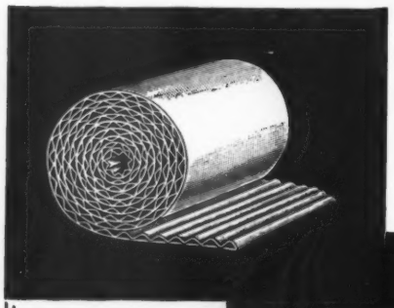


Aristocrat Baseboard Register

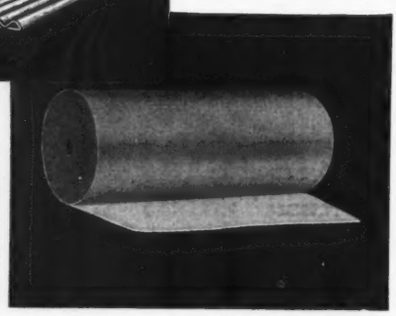
THE AUER REGISTER COMPANY, 3608 PAYNE AVENUE, CLEVELAND, OHIO

AUER DISTINCTIVE REGISTERS & GRILLES For Air Conditioning *and* Gravity

SAL-MO Asbestos Insulation Curbs HEAT LOSS in Warm Air Furnace Installations . . . Assures More Efficient Operation.



(Left) SAL-MO Asbestos Aircell Paper



SAL-MO Asbestos Paper and Rollboard

BE sure that your Warm Air Furnace installations do not have that 30% heat loss that is usual with uninsulated pipes. When you use SAL-MO Asbestos Papers and Millboards you are sure of a perfect job and perfect insulation. SAL-MO Asbestos Products are of uniform high quality, manufactured from the best grade of Canadian asbestos fibre.

Other SAL-MO Products include Pipe Joint Tape, Furnace Cement, Fireboard and coverings for all types of High and Low Pressure Pipe Lines.

SALL MOUNTAIN COMPANY
176 West Adams St. CHICAGO, ILL.

NIAGARA

Gas-fired, Cast Iron

HEAT EXCHANGER

As low as $49.00* DEALER PRICE

HERE is an opportunity to close those heating jobs where low cost is the buyer's first consideration.

By building your own casing and hood and using a Niagara gas-fired, gravity heat exchanger you can meet all requirements for a high quality, efficient heating unit with a high BTU rating and low operating cost.

Niagara gravity heat exchangers are now available with one, two, three or four side radiating sections, and with one or two burners. Automatic controls and blower equipment, supplied by Niagara, can be added quickly and easily.

Write today for descriptive folder and prices of Niagara heat exchangers, casings and hoods, and automatic controls.

* Price quoted covers one burner unit with one side radiating section.

THE FOREST CITY FOUNDRIES CO.
2500 WEST 27th STREET • CLEVELAND, OHIO

With the Manufacturers . .

Fox Fifth A-C School

The fifth consecutive year of Air Conditioning Engineering Schools was under way for Sunbeam jobbers and dealers when The Fox Furnace Company opened its Chicago School January 18.

The classes this year continue for three days, during which the students will be given instructions in calculating and laying out air conditioning systems. Installation problems will be stressed and ample time given to sizing of ducts, registers and grilles. Lectures and demonstrations on controls, blowers, motors and other accessories will be given by recognized experts.

A new feature of the Sunbeam schools this year will be instruction in cooling or summer air conditioning. This instruction will be given on the day following the three-day heating course.

The text used will be a condensed Sunbeam Cooling Manual just issued.

In addition to the Chicago School, January 18 to 20, similar schools will be conducted at

Cleveland—February—1-2-3
Atlanta—Fegruary—15-16-17
New York—March—1-2-3
St. Louis—March—15-16-17
Boston—March—29-30-31

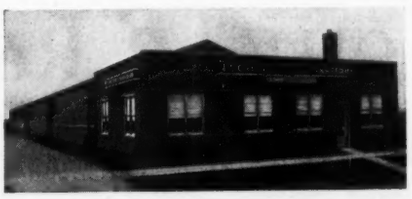
◆

Logan-Scherff

William A. Scherff, formerly manager of the Oil Furnace Division of the Air Conditioning Division of the General Electric Company, Bloomfield, N. J., and Boyd H. Logan of the same organization, operating under the name of Logan and Scherff, 40 West 40th Street, New York City, are exclusive distributors in the metropolitan section, including Long Island, Westchester and Rockland counties, and northern New Jersey south to Trenton, for The Fox Furnace Company of Elyria, Ohio.

They will sell exclusively the entire Fox line direct to the contractor and dealer of warm air heating and residential air conditioning.

◆



Lochinvar Moves

Lochinvar Corporation, Detroit, moved January 1 to 14247 Tireman, Dearborn, Michigan, a suburb of Detroit, where they have completed a new factory to take care of increased volume.

◆

Plans New Furnace

"Home Comfort" Furnace & Mfg. Co., 2901 Elliot Ave., St. Louis, Missouri, reports tooling up its plant to produce an all steel, crescent, coal fired furnace having a full steel front of a streamlined appearance; both feed door and ash door recessed; grates of the locomotive type with waist high shaker.

These furnaces are to be made in 20, 22, 24 and 26-in. sizes. Dealer prices are to be competitive with other equipment of similar quality and design.

CORRECTION

Lochinvar Corporation, Dearborn, Mich., advises that its description of its Model 100 unit in its advertisement, page 94, January, 1938 AMERICAN ARTISAN should have read "automatic oil burning unit" instead of "automatic air conditioning unit."

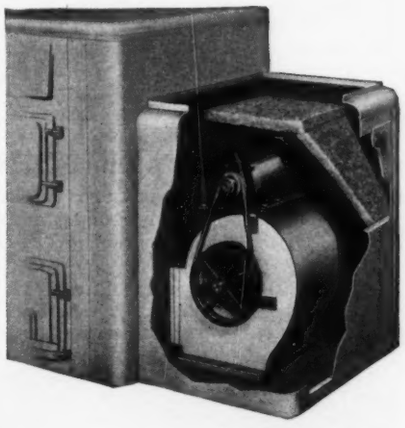
LOWER PRICES for 1938

ON

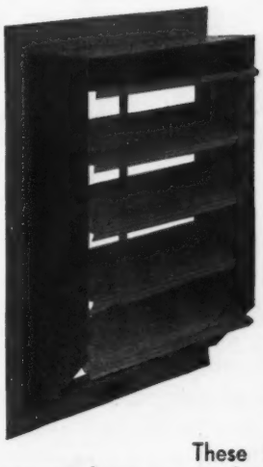
Furblo Cabinet Units

WRITE TODAY FOR YOUR NEW FURBLO PRICE SHEET

Order Furblo Today from Your Jobber or Write to



Furblo Co., Hermansville, Mich.



AMERICAN FAN LOUVRES

Heavy welded steel frame, drilled for mounting to wall or duct. Aluminum louvres, working in unison, open from fan pressure and close automatically when fan is not in operation.

These louvres can be made of copper, brass or stainless steel to meet special requirements. Can also be furnished with mounting brackets and motor for electrical operation.

OTHER **AMERICAN** PRODUCTS

Warm Air and Ventilating Grilles
Multiple Louvre Dampers and Screens
Mixing Dampers

Fused Link Fire Dampers and Screens
Single Leaf Volume and By-pass Dampers

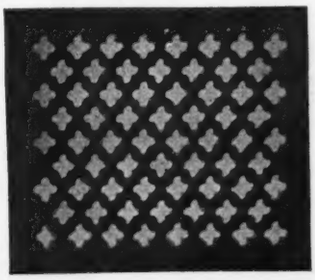
The American Warming & Ventilating Co.
1017 Summit Street Toledo, Ohio

PERFORATED METALS

ARCHITECTURAL GRILLES

In Bronze, Steel, Stainless Steel, Monel, Aluminum, and other metals. Grilles of distinction for fine buildings in a wide variety of attractive designs. All of the standard and many original and modern designs are available in any metal, and of all dimensions, carefully made from selected stock. Grilles are but one of our specialties. We make Perforated Sheets of every type.

Pleasing Prices, Prompt Service



50 Years Experience Perforating Metals

The Harrington & King Perforating Co.

5649 Fillmore St., Chicago, Ill. New York Office, 114 Liberty St.

HIGH *Speed* SHEARS

FOR CUTTING IRREGULAR SHAPES FROM SHEET METAL

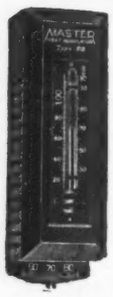
Inside cutting without starting holes or removing metal. Stop the cut at any given point. Standard equipment furnished for ring and circle cutting . . . absolutely accurate and easily operated . . . metal is sheared and not punched . . . only one adjustment for various thicknesses of material used . . . unobstructed cutting vision . . . no further finishing required. No special cutters, pilots, templates, or strippers are needed . . . long life shear blades. Write for complete information.

LIBERT MACHINE COMPANY, Green Bay, Wisconsin

Manufacturers of shears since 1915

Libert Hi-Speed SHEAR

MASTER HEAT REGULATOR



A sturdily built, trouble-free line of heat regulators that is noted among architects and builders for accuracy and dependability. Twenty years of constant effort have resulted in its outstanding efficiency. Master Heat Regulators respond to a temperature change of 1 degree.

Type B-22
Dealers' Cost $14.10

The perfect unit for the small home. Low first cost, no maintenance expense and it will outlast the heating plant.

Manufactured by the makers of the famous Type B-144, the Original Gradual Control Heat Regulator.

WHITE MANUFACTURING COMPANY
2362 University Ave., Minneapolis, Minn.

PREMIER FURNACE CLEANERS
COMPLETELY EQUIPPED

ONE HORSE POWER MODELS
84.50 and 89.50
HALF HORSE POWER MODELS
60.00 and 64.50

Premier Furnace Cleaners are powerful and light weight, yet sturdily built to stand years of rugged service. Weighing less than 50 pounds, they are one-man cleaners and have been the furnace man's favorite for years. Premier Cleaners are ideal for upstairs use and may be used independently from the container for suction and blowing use in cleaning air ducts, registers, grills, radiators and air conditioning equipment.

Motor specifications for these powerful cleaners are:
1 H.P. maximum vacuum 46 inches in water.
½ H.P. maximum vacuum 31 inches in water.

Business-Getting, Return Post Cards are Available for Dealers at Low Cost
Buy It From Your Local Jobber or Write the Manufacturer
Furnace Cleaning Instruction Booklet Free with Each Cleaner

ELECTRIC VACUUM CLEANER CO., INC.
1734 Ivanhoe Road • Cleveland, Ohio

With the Manufacturers . .

Conductor Strap Prices

Rival Strap Corporation of 308 West 20th Street, New York City, David Levow, President, announced a reduction in the trade and jobbers' prices of "Rival" and "Fit-rite" Copper conductor straps. The price change was effective as of January 3, 1938.

◆

Engineering Schools

The Dail Steel Products Company, of Lansing, Mich., is conducting a series of engineering schools for dealers and other interested parties in Lansing. The discussions will be seven in number and will cover heating, insulation, humidity, gas heating, coal stoker, oil burning, heating and displays of gas, oil and coal.

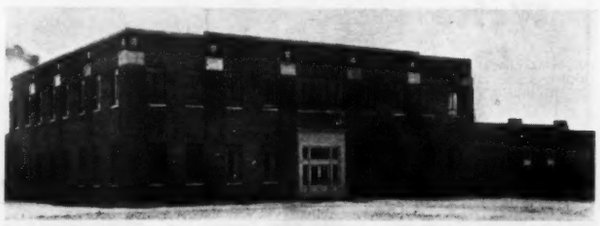
A luncheon is donated by the particular parties interested in each of the subjects under discussion and there were 65 men at the first meeting and 185 men at the second meeting.

◆

New Fox Office Building

The Fox Furnace Company has just announced the completion of their new office building at Elyria, Ohio, which is "as modern as air conditioning."

The building is constructed of brick. The interior walls are sand finished plaster and English Oak woodwork. The



attractive lobby is of black walnut with chromium trim.

Lighting is given particular attention in this new building. Windows are of the metal casement type with a ventilating section at the bottom. An indirect lighting system is installed. 1938 will also bring the 54th anniversary of the organization.

◆

O'Connor Steel in New Location

O'Connor Steel Company, Akron, Ohio, wholesalers, of which Leo J. O'Connor is president, has purchased a new building at 162 E. Center Street, where they now have a complete show room for furnaces and all types of sheet metal equipment, with ample warehouse space. The company was formerly located at 187 South Broadway.

◆

Lyon, Conklin Banquet

Lyon, Conklin & Co., Inc., Baltimore, tendered a banquet to their employees and affiliate companies on December 30th in the banquet hall at their main office and plant, Race and McComas Streets. Over 100 persons attended.

Among the guests were Samuel Jones of the Carnegie-Illinois Steel Corporation; Wallace T. McCall of the Barber Company, and Carl Emery of the Emery Advertising Company.

Vice-President Robert H. Lyon presided as toastmaster in the absence of President Edgar Lyon. He gave an instructive talk, picturing the background of the company, founded by his father, William L. Lyon, from its birth in 1860 until the present time, making the company 77 years old.

Among the employees was one with 55 years of service, and one for fifteen days. Service buttons and pins were presented to employees that have been with the company 5 or more years. To Andrew Snyder, superintendent of the factory, serving the company for 55 years, a gold button surrounded with diamonds was given.

FIRST AGAIN!

NOW—The ALDRICH FUEL UNIT —startling, revolutionary, but tested and proven!

No more transportation to and from factory on worn or defective pumps. The pumping member in the *Aldrich Fuel Unit* is a separate and replaceable Unit totally enclosed in a compartment connected to the Supply Tank, never subjected to pressure.

World's Greatest Fuel Unit—Cut-off "Sharp as Lightning." "Positive as Fate."

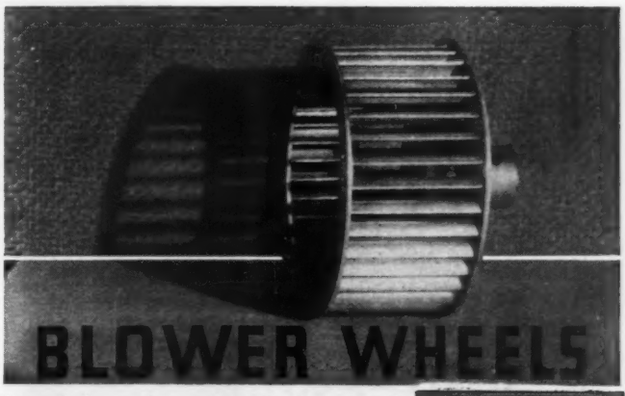
If Pump leaks — the leak is caught in this compartment instead of running on the floor.

ON 1938 ALDRICH BURNERS

All Aldrich Dealers are furnished with a supply of pumping members — Worn or defective members may be replaced in a jiffy. Reconditioned for $1.00 or less.

Write for new Sales and Service Plan to

ALDRICH COMPANY · Peoria, Illinois



Precision Standards Applied to Quantity Production

For furnace manufacturers who buy wheels only, Clarage offers any size desired, and can meet any quantity requirement. Clarage Wheels can be furnished standard width, or any percentage of standard width to deliver a specified volume of air at any operating speed. All wheels are PERFECTLY BALANCED for quiet operation without vibration.

Clarage Furnace Fans (complete assemblies) combine many advantages. They are positive centrifugal type, very compact, highly efficient, and the low speeds insure SILENT OPERATION.

Write for complete information and price schedules.

SPECIFY CLARAGE for COMPLETE AIR CONDITIONING · VENTILATION · HEATING · COOLING · MECHANICAL DRAFT · FANS & BLOWERS FOR INDUSTRIAL NEEDS

CLARAGE FAN COMPANY • Kalamazoo, Mich.
SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES

WHITNEY LEVER PUNCHES

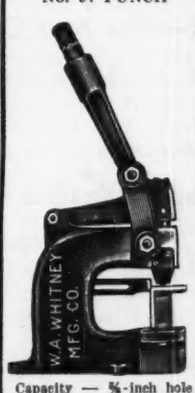
No. 4B PUNCH

Length—8½ inches. Capacity ⅛-inch through 16 gauge. Deep Throat—2 inches. Weight—3 pounds. Punches and Dies—$\frac{1}{16}$" to $\frac{1}{8}$" by 64ths.

No. 6 PUNCH

Length—26½ inches. Capacity — ¼-inch hole through $\frac{1}{16}$-inch iron; especially adapted for button punching or templet work. Punches and dies ⅛" to $\frac{1}{16}$" by 32nds.

No. 9½ PUNCH



Capacity — ⅝-inch hole through ¼-inch, 1-inch hole through $\frac{1}{16}$-inch and 2-inch hole through ⅛-inch iron. Depth throat 5 inches. Weight—82 lbs.

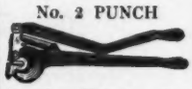
We have tools for every purpose needed by Sheet Metal Contractors.

Ask your Jobber

No. 1 PUNCH

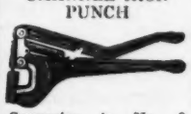
Length — 34 inches. Capacity — ⅜-inch hole through ¼-inch iron. Punches and dies in sizes from ⅛ to $\frac{1}{16}$ by 64ths.

No. 2 PUNCH



Length — 23 inches. Capacity — $\frac{1}{16}$-inch hole through ¼-inch iron. Punches and dies in sizes $\frac{1}{16}$-inch to ½-inch by 64ths.

CHANNEL IRON PUNCH



Companion to No. 2 Punch. Every part of the two Punches Interchangeable, including punches and dies. Capacity—½-inch hole through ¼-inch iron.

W.A. WHITNEY MFG. CO.
636 RACE ST. ROCKFORD, ILL

POPULAR PRICED . . .

and easily the BEST value in Warm Air Humidifiers!

● Measured by any standard, THERMO-DRIP Automatic Humidifiers offer everything you and owners of furnace-heated homes can ask for in modern air moistening equipment. Bonnet temperatures regulate the water feed and thus control the amount of water evaporated—no instruments to manipulate—no floats—no guesswork or uncertainty about humidification. In addition, stainless steel pans and Monel metal valves—exclusive THERMO-DRIP features—keep the efficiency of these humidifiers up as the years go by and eliminate replacements and repairs. Still, THERMO-DRIP Humidifiers are purse-easy! They are humidifiers you can sell profitably to the huge popular-priced home market. Write today for complete details.

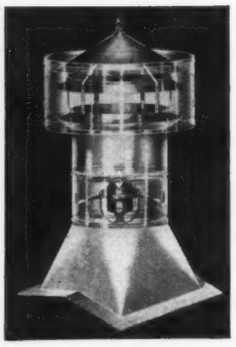
AUTOMATIC HUMIDIFIER CO.
18th and Main Streets ● CEDAR FALLS, IOWA

THERMO-DRIP HUMIDIFIERS

New BURT

Standard Fan VENTILATOR

for Heavy Duty Ventilation at Low Cost



You can sell this new Burt roof ventilator with assurance for any job where a big volume of air must be moved at low cost. Scientific design, quality materials and careful workmanship make Burt roof ventilators most satisfactory in every particular. Burt Engineers are glad to help you estimate and lay out plans. Write for new literature.

THE BURT MFG. CO.

ROOF VENTILATORS • OIL FILTERS • EXHAUST HEADS

301 MAIN STREET AKRON, OHIO

THE PUBLIC DEMANDS QUALITY!

CHALMERS HAS IT

17 YEARS of active experience! Used widely in America, Europe, Asia and Africa. Carries Underwriters and New York City approval. Used by the U. S. Government. Adapted to Boiler-Burner and Furnace Units. New literature available for interested dealers — Write today.

MEMBER OBI OIL BURNER INSTITUTE

USE YOUR LETTERHEAD, IT STIMULATES US!

CHALMERS OIL BURNER CO. 1251 Central Avenue MINNEAPOLIS, MINN.

New Literature . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 96.

101—Stainless Steel Electrodes

Page Steel and Wire Division, American Chain & Cable Company, Inc., Bridgeport, Conn., is distributing a booklet on stainless steel electrodes, containing considerable information regarding the various grades of stainless steels and the procedure for welding them.

102—Tank Heads

The Commercial Shearing & Stamping Co., Youngstown, Ohio, has just released a new 28-page catalog, which features their line of tank heads.

103— Modern Oil Stoves

Perfection Stove Company, Incorporated, Cleveland, Ohio, is distributing Catalog No. 38 entitled "Modern Oil Stoves" for cooking and heating.

104—Power Squaring Shears

Niagara Machine & Tool Works, 637 Northland Avenue, Buffalo, N. Y., is distributing Bulletin H., illustrating and describing Niagara Series H power squaring shears.

105—Perfex Twin Contact No. 3

Perfex Corporation, Milwaukee, Wisconsin, has published issue No. 3 of Perfex Twin Contact. Limit controls and relays are illustrated and described.

106—Portable Electric Tools

Skilsaw, Inc., 3310 Elston Avenue, Chicago, has just published a new general catalog of their portable electric tools —handsaws, drills, grinders, belt sanders, disc sanders, floor sanders, blowers and suction cleaners.

107—Punches, Notchers and Shears

J. F. Kidder Mfg. Co., Inc., 426 Colchester Avenue, Burlington, Vermont, is distributing a price list and descriptive folder of their No. 32 and 33 punches, notchers and shears.

108—Pipe Area Charts

Armstrong Furnace Co., Columbus, Ohio, is distributing two folders—one describing their oil-burning air conditioning unit and the other the new Supreme steel furnace. A small booklet of "Pipe Area Charts" for gravity and mechanical warm air heating is also available.

109—Copper Roofing Instructions

The American Brass Company, 25 Broadway, New York City, is distributing "Suggestions for Installing Anaconda Economy Copper Roofing." The book contains 65 full-page plates showing successive steps in laying copper roofing by both the pan and roll method.

110—Anthracite Sales Story

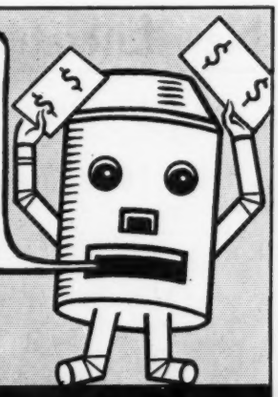
Anthracite Industries, Inc., 405 Lexington Avenue, New York City, recommends thermostat installation for automatic draft control in a folder with a cartoon depicting how one salesman made one call, but closed two sales—a thermostat and the winter coal supply.

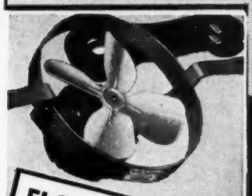
A series of newspaper mats is also offered retail merchants purchasing Anthracite from one of their contributing, producing companies.

111—Spot Welder

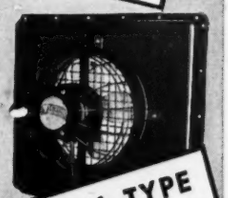
Eisler Engineering Co., 740-770 South 13th Street, Newark, New Jersey, announces the new Eisler spot welder and welder tips catalogue 38W entitled "Electric Spot and Butt Welding Machine" recently issued. The catalogue contains 100 pages and has over 1,250 illustrations on various welding problems.

Easy Profits Making COLD ROOMS Warm and Cozy!





FLOOR TYPE LIST PRICE $7.50



WALL TYPE LIST PRICE $10.00

VICTOR HEAT BOOSTERS

IT takes less than three minutes to cure any cold room with a Victor Heat Booster. The powerful fan first pulls out the cold air "cork" and then brings up the heat in a hurry. Overcomes sluggishness of long horizontal runs or undersized ducts. Counteracts abnormal drafts or lack of proper insulation or weatherstripping. Help yourself to extra profits by pushing Victor Heat Boosters—a demonstration will sell four out of five home owners. Write for complete details today!

VICTOR ELECTRIC PRODUCTS, INC.
710 Reading Road Cincinnati, Ohio

Midget Kooler-aire

Cleans—Cools—Circulates

Sells easily to small stores, cafes, bars, beauty parlors, offices and other similar places.
Midget Kooler-Aire operates on the same basic principles as the thousands of larger Kooler-Aire Systems in successful operation. It brings in 100% fresh air, washes out dust and dirt, cools it to the comfort point and circulates it gently.

Write today for detailed information, and catalog of all U. S. AIRCO equipment.

US AIRCO Air Conditioning EQUIPMENT

UNITED STATES AIR CONDITIONING CORPORATION
2105 KENNEDY ST., N. E.
MINNEAPOLIS MINN.

Variable Pulley

DEPENDABLE

Congress Pulleys are dependable. Operation under the most trying conditions has proved to manufacturers that top performance from their equipment is always the result of installing Congress Pulleys. Made in sizes and styles to fit every requirement these Pulleys offer the dealer a reputable and profitable line to handle.

Drop us a line TODAY for free literature.

CONGRESS TOOL & DIE COMPANY
9034 Lumpkin Ave., Detroit, Michigan

Nu DRY

FURNACE CEMENT

Best by Test

Set your repair jobs with Nu Dry. The economical, durable cement, you can't do better than Nu Dry. Check the six superior features.

Fill out the coupon for free 5½ lb. sample. . . .

- It comes to you in dry form.
- Takes less material to set a furnace.
- Does not crack or powder when furnace is fired immediately after applied.
- Will not shrink—keeps joints tight—stands high temperature—is not affected by temperature changes.
- No loss because it will not harden in containers—will not freeze in winter.
- Requires only 5½ lbs. where you ordinarily use 10 lbs.

We'll prove it further! You just fill out the coupon.

PYROLITE PRODUCTS CO.
1221-31 W. 74th St., Cleveland, Ohio

Name .....
Address .....
Jobber's Name .....
Jobber's Address .....

ANSWERING THE INDUSTRY'S *Most Pressing Problem* WITH A *New Type of Craftsman*

● One of the serious obstacles to the continued growth of your industry is the ACUTE SHORTAGE OF REALLY COMPETENT MEN for sales and making and servicing air conditioning and refrigeration installations. Furthermore, the incompetence of many now in the ranks constantly results in the defeat of your best-laid sales program, killing public desire for your wares, creating customer dissatisfaction, and in *financial loss to you.*

Only by effective training of men both upon a qualitative and quantitative basis can your man-power problem be solved and the success of your efforts be insured.

With these requirements in mind, the Refrigeration and Air Conditioning Institute of Chicago has moulded its Training Program so that the student is so grounded in theory that he actually thinks in terms of refrigeration and air conditioning, and so that he learns the service and installation of equipment by intimate contact with all conventional types in our laboratory, the only one of its kind, so far as we know, under the actual supervision of factory engineers.

This Training Program is planned to DEVELOP THE UNTRAINED, to teach the PRACTICAL APPLICATION of theory to the COLLEGE TRAINED MAN, and to PERFECT THE PRESENT TECHNICIAN. Thus it makes the benefits of a new profession available for men in all walks of life, and it broadens the source of man-power for your Industry, and gives to the Industry a new type of craftsman.

Mr. Employer, will you advise us of your requirements, so that we may be of service to you in solving your MAN-POWER PROBLEM?

More than 100 leading Manufacturers "officially" endorse and recommend this training program.

Ray K. Smith
PRESIDENT

REFRIGERATION & AIR CONDITIONING INSTITUTE
2130-2158 LAWRENCE AVENUE CHICAGO, ILL.

H&C DAMPER REGULATOR SETS

BRACKET TYPE

With ¼" Bearings as shown No. 50¼.
⅜" size No. 50⅜.

DISK TYPE

With ¼" Bearings as shown No. 80¼.
⅜" size No. 80⅜.

¼" sets have snap end bearings for easy installation of small dampers. All sets may be used with either splitter or regular dampers. All parts have rust-proof finish. Insure satisfactory installations by using H & C Damper Regulator Sets. All leading jobbers carry them.

HART & COOLEY MFG. CO., 61 W. KINZIE ST., CHICAGO, ILL.

New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on page 96.

112—Sheet Strip Stock List

Central Steel & Wire Company, Chicago, Detroit and Dayton, is distributing Stock List No. 38. Facilities enable the company to slit to width and shear to size.

◆

113—Wrapped Galvanized Sheets

The American Rolling Mill Company, Middletown, Ohio, offers a new folder titled "Unwrap Galvanized Sheets like Chocolate Bars?" with space for imprinting the shop's name and address. The leaflet is designed to help sheet metal shops sell more galvanized iron.

◆

114—Furnace and Boiler Cleaners

Electric Vacuum Cleaner Co., Inc., 1734 Ivanhoe Road, Cleveland, Ohio, is distributing a folder illustrating and describing their Premier furnace and boiler cleaners designed and built especially for furnace and boiler cleaning. Instructions on how to operate the cleaner are included.

◆

115—Grilles and Grille Bars

The Independent Register Co., 3747 E. 93rd Street, Cleveland, Ohio, is distributing a 4-page folder illustrating and describing their grilles, with individual adjustment of grille bars.

◆

116—A. C. Registers and Grilles

Waterloo Register Company, Waterloo, Iowa, is distributing a 28-page catalog of their AirMaster registers and grilles for air conditioning. Frames, installations and fin arrangements are discussed, as well as finishes, selection and characteristics.

◆

117—Two New Folders

The Barber Gas Burner Co., Cleveland, Ohio, is distributing two envelope stuffers—one entitled "If You Dig Deep Enough, You'll Strike Gas," and the other "Save on Gas with a Barber Gas Pressure Regulator." The first sets forth the advantages of gas heat, while the second describes the savings with a pressure regulator to counteract uneven pressure in the gas line.

◆

118—Modern Anthracite Equipment

Anthracite Industries, Inc., New York City, has prepared a booklet entitled "Modern Anthracite Equipment" which lists and describes such varied equipment as thermostatic controls, warm air furnaces, forced warm air circulation systems, boilers for steam vapor and hot water, magazine feed heaters, automatic burners with ash removal, and bin feed conveyors, air conditioning with warm air, steam, vapor, and hot water, automatic domestic water heaters, space heaters, fireplaces, cooking stoves and ranges, and a section devoted to modernized basements.

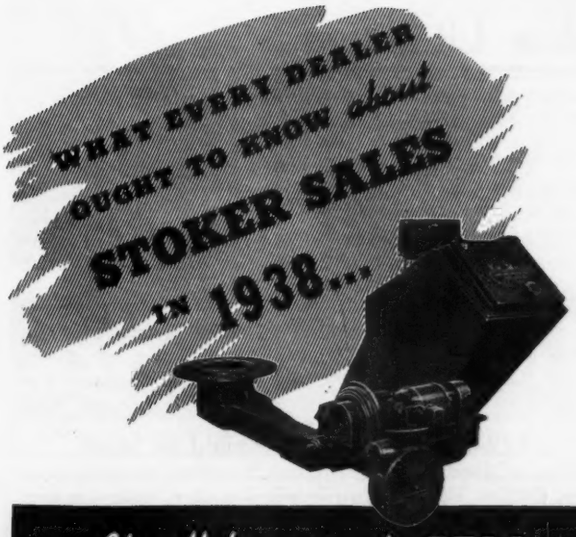
◆

119—What to Make and How

The Youngstown Sheet & Tube Co., Youngstown, Ohio, has just published a book of instructive photographs which pictorially tell the story of steel from iron ore mine to finished products.

Compiled in the style of popular picture-story magazines using action photographs and brief, to-the-point captions, the book contains 115 pages of basic steel information including a total of 135 action photographs taken in the company's mines and mills in a leatherette cover. The book is entitled "What We Make and How We Make It."

The book covers the story of steel from iron ore mining to the pouring of ingots and the cutting of billets, and illustrates the manufacture of flat rolled steel, flat rolled steel in lighter gauges, tin plate, butt weld pipe, lap weld pipe, seamless pipe, electric weld pipe, electrical conduit, rods and wire, wire nails, bars and shapes, railroad tie plates and forged steel unions.



It will be easier to **SELL**

KŌL-MASTER

than to **COMPETE** *against it!*

COMPARE KOL-MASTER WITH ALL OTHER STOKERS *and see why!*

KOL-MASTER CORP., OREGON, ILL.

BENDING BRAKES **WHITNEY-JENSEN** METAL TOOLS

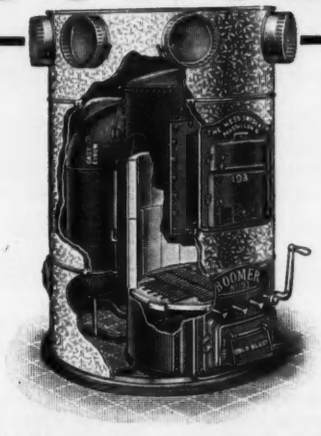
New! **No. 75 DUPLEX ROLLING MACHINE**

• Look at these ADDED features! TWO sets of rolls—made for similar, or different, forms. Large (1 h.p.) motor. Capacity 18 ga. sheets at 38 ft. per min. Weight, 1200 lbs. Welded steel base with adjustable feet. Sheet metal covers for neat appearance and easy cleaning. Roller bearings and central gear drive on heavy (1⅜") roll spindles. SAVE MONEY by *rolling* Pittsburgh Locks, Drive Cleats, etc.—also many other forms on special rolls made to order.

Send for Circular and Prices

WHITNEY METAL TOOL CO. • 91 Forbes Street, Rockford, Illinois

The HEIGHT of ECONOMY



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Boomer Furnaces have economy built right into them . . . economy in fuel consumption as well as in cost of maintenance. They are engineered to do a maximum heating job with minimum fuel . . . they get heat to the registers when you want it and where you want it. Whether it's the Boomer Steel or Cast Iron Furnace your customer is assured of the "tops" in quality . . . for long life is the standard to which these furnaces are built. Boomer Furnaces will "Boom" your business . . . increase your sales and build for you a long list of satisfied customers. Write for full information at once.

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RANDALL PILLOW BLOCKS
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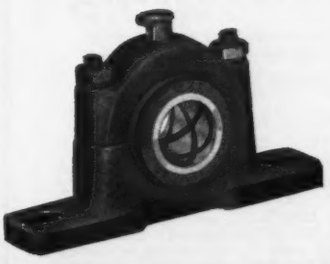
Improvement in Randall Pillow Blocks has always kept ahead of the rapid improvement in air conditioning equipment. Because of that fact and their remarkable quietness and long trouble-free service in the field, they have been accepted as standard equipment by the majority of air conditioning equipment manufacturers.

Let us quote on your yearly requirements for pillow blocks. Our new price list showing many reduced prices is now available. Write for a copy without obligation.



On light duty, normal furnace blower or air conditioning equipment, the Randall Standard Pillow Block should last a lifetime.

Randall **GRAPHITE PRODUCTS CORP.**
Dept. 210, 609 W. Lake St., Chicago, Ill.

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...Offering New Utility
...New 2-Way Control

Precision built . . . more sensitive. For high-limit control on stoker, blower or damper motors. Or it may be wired for either rising or falling temperatures to regulate heating output. Adaptable to either high or low voltage control on any two or three wire circuit. You stock only ONE switch for BOTH uses. Assures complete owner satisfaction, a wider margin of profit for you.

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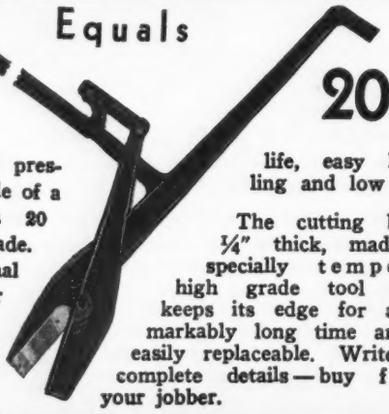

Every pound of pressure on the handle of a Viking produces 20 pounds at the blade. Viking's original compound lever arrangement does it. Choose a Viking for its strength, long life, easy handling and low cost.

The cutting blade, ¼" thick, made of specially tempered high grade tool steel, keeps its edge for a remarkably long time and is easily replaceable. Write for complete details—buy from your jobber.

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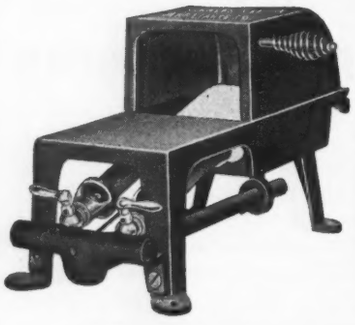

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A compact, efficient, economical Bench Furnace designed to heat soldering coppers up to 6 lbs. per pair. Heavy refractory lined fire-box makes heat-treating, tempering and annealing work possible. No forced air blast required. Equipped with one powerful Johnson Bunsen Burner. Patented curved shaped hood forces a return blast over to tops of the irons. Built to give years of trouble-free service. Write for free catalog.

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—What happens between two rooms, one having a six minute air change, and the adjoining room a twelve minute air change?
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The answers to these and hundreds of other mechanical questions about air conditioning are appearing in the monthly *Air Conditioning Section* of AMERICAN ARTISAN.

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AMERICAN ARTISAN
6 North Michigan Ave. Chicago, Ill.

New Literature . . . .

For your convenience in obtaining copies of new Literature, use the coupon on this page.

120—Blowers, Motors, Humidifiers

Russell Electric Company, 340 West Huron St., Chicago, is distributing Bulletins B-1, H-1, H-2, H-3, H-4 and H-5 on their blowers, humidifiers, humidistat, Solenoid valve and strainer, jet nozzle and strainer, and target with particle separator, pan and fitting.

121—Sample Kit of Expanded Metal

Milcor Steel Company, Milwaukee, Wisconsin, is offering actual samples of Milcor Standard Expanded and Flat Expanded Metal in a new "Expanded Metal Sample Kit."

122—Sales Appeal Applied in Steel

Berger Manufacturing Division Republic Steel Corporation, Canton, Ohio, is distributing a 4-page folder covering their design fabrication service, and entitled "Sales Appeal Applied in Steel." Among the recent products shown with Berloy custom tailoring are an air conditioning cabinet, hot water heater jacket, gas furnace cabinet, boiler jacket and an oil burning air conditioning jacket.

123—Booklet No. 106

Niagara Machine & Tool Works, Buffalo, is distributing booklet No. 106—Niagara Presses, Punches, Squaring Shears, Rotary Shears. These various machines for plate and sheet metal work are illustrated, many with action photographs, and briefly described. The booklet is a condensed reference book on machines used in the industry.

124—Controlling Valves Electrically

Automatic Switch Co., 154 Grand Street, New York City, is distributing a miniature appearing text book entitled "Controlling Valves Electrically." The subjects treated are: "The Problem; What Can Be Controlled; Use of Pilot Control; What Can Be Used; Choosing the Proper Valve; Why Asco Solenoid Valves."

125—Zinc-Alloy Steel

Inland Steel Company, 38 S. Dearborn St., Chicago, is distributing a four-page piece of literature on Inland Zinc-Alloy Steel—zinc and steel permanently fused together. Zinc-Alloy sheets are said to withstand fabrication without flaking, provide a rust-resisting zinc base for modern finishes, withstand heat, and provide long life.

126—Rotary Ventilators

The Swartwout Company, 18511 Euclid Avenue, Cleveland, is distributing Bulletin No. 205 on rotary ventilators entitled "Controlled Air Circulation for Industrial and Commercial Buildings with the Swartwout Rotary Ball-Bearing Ventilator."

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Please ask the manufacturer to send me more information about the equipment mentioned under the following reference numbers in "New Products" and "New Literature." (Circle numbers in which you are interested):

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AN ALL PURPOSE AIR VELOCITY METER

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Instantaneous-Direct Reading
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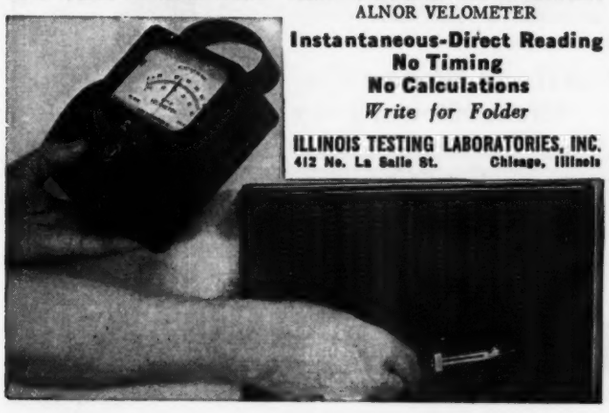

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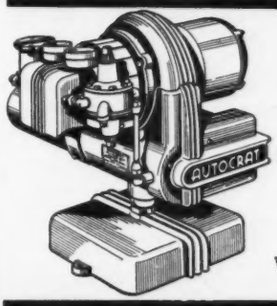

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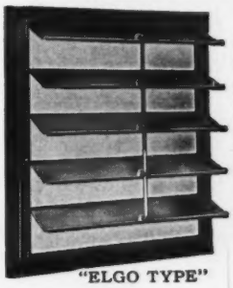

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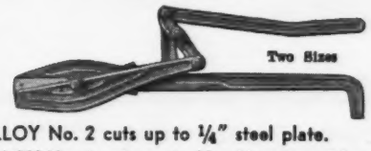

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Special blades may be had for shearing stainless steel.

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Indiana Convention

(*Continued from page* 35)

due to the fact that there is less competition, fewer qualified contractors, and conditions which must be thoroughly understood by the designer. That very frequently suggested designs of ventilating systems differed widely and as a result each contractor has an opportunity to sell the merits of his particular suggested plan.

That the air-change basis is used for designing heating systems to overcome stratification, but in ventilation, stratification is often desirable and the contractor should make use of it. Whereas high ceilings very frequently offer series problems in heating, high ceilings are a distinct advantage in ventilation work. The best basis for figuring ventilation is cfm for a particular condition.

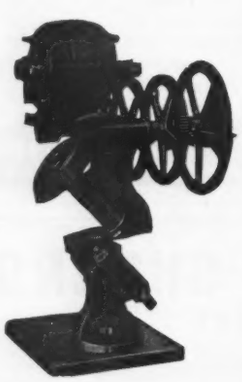
Filters

J. E. Harden, engineer of the Round Oak Company, speaking of filters, explained that at present there are two popular types—the throw-away and the oil-impregnated filter, which can be cleaned—that the average shop probably finds it easier to handle the throw-away filter. Mr. Harden suggested the throw-away filters can be used for a longer period if the filter is removed two or three times a year, knocked on the floor, and the top dirt removed by broom or vacuum cleaner. Filters should be selected of adequate size so that the velocity through the filter is not too high, and also in order to reduce the resistance of the filter. Filters should be installed so that there are no leaks around the filter as inspection shows that such leaks very frequently permit a very large percentage of the total air volume to by-pass the filter without cleaning results. A regular inspection service of filters by the contractor can be built into a very profitable business and also frequently leads to additional work or to additional prospects. Mr. Harden reported one interesting instance where a ventilation and filtering system was installed for one bedroom of an individual suffering from hay fever and the result was that within twenty minutes of occupying the room the symptoms disappeared.

Controls—Past and Future

E. J. Snetsinger of the Minneapolis-Honeywell system, speaking on the subject of controls, declared that in his estimation there is too much mystery connected with the general subject of controls and that actually controls are very simple and installation and adjustment can easily be understood by every contractor. Mr. Snetsinger traced briefly the history of automatic controls for residential air conditioning from the time when clock motors and very simple thermostats were used, followed by the installation of limit controls to prevent room temperature overrun, through the installation of the first forced warm air systems which required some type of control to start and stop the fan as well as control the source of heat supply; then the introduction of the combined fan and limit control; through the introduction of program controllers.

Mr. Snetsinger declared that he believed today most interest is directed toward the use of zone control systems and control instruments for two-speed fan operation and that these two modern methods of air distribution have been proved in the Research Residence to be highly satisfactory. He pointed out briefly that the two-speed fan operation permits constant balance of the air distribution and very frequently results in a saving of electrical power, also in heat cost and more uniform conditions within the space heated. The speaker declared that in his estimation, zone control is only now gaining popularity and that zone control and zone distribution of air will within the next two years be the accepted method of air distribution.



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Built in various sizes to cut up to ½" plate any width straight, circular or irregular. Can be had in either bench or floor type for either hand or power operation, or arranged for motor drive.

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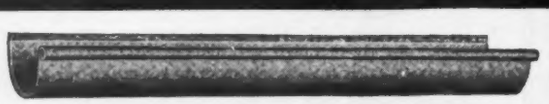

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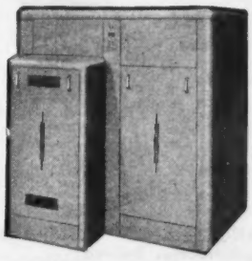

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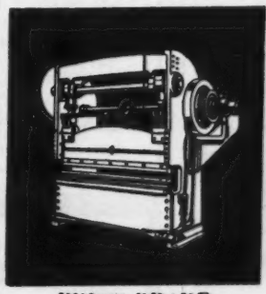

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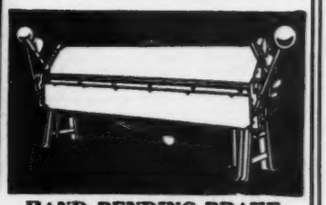

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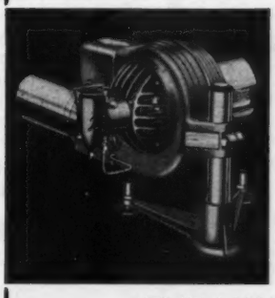

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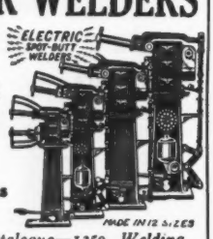

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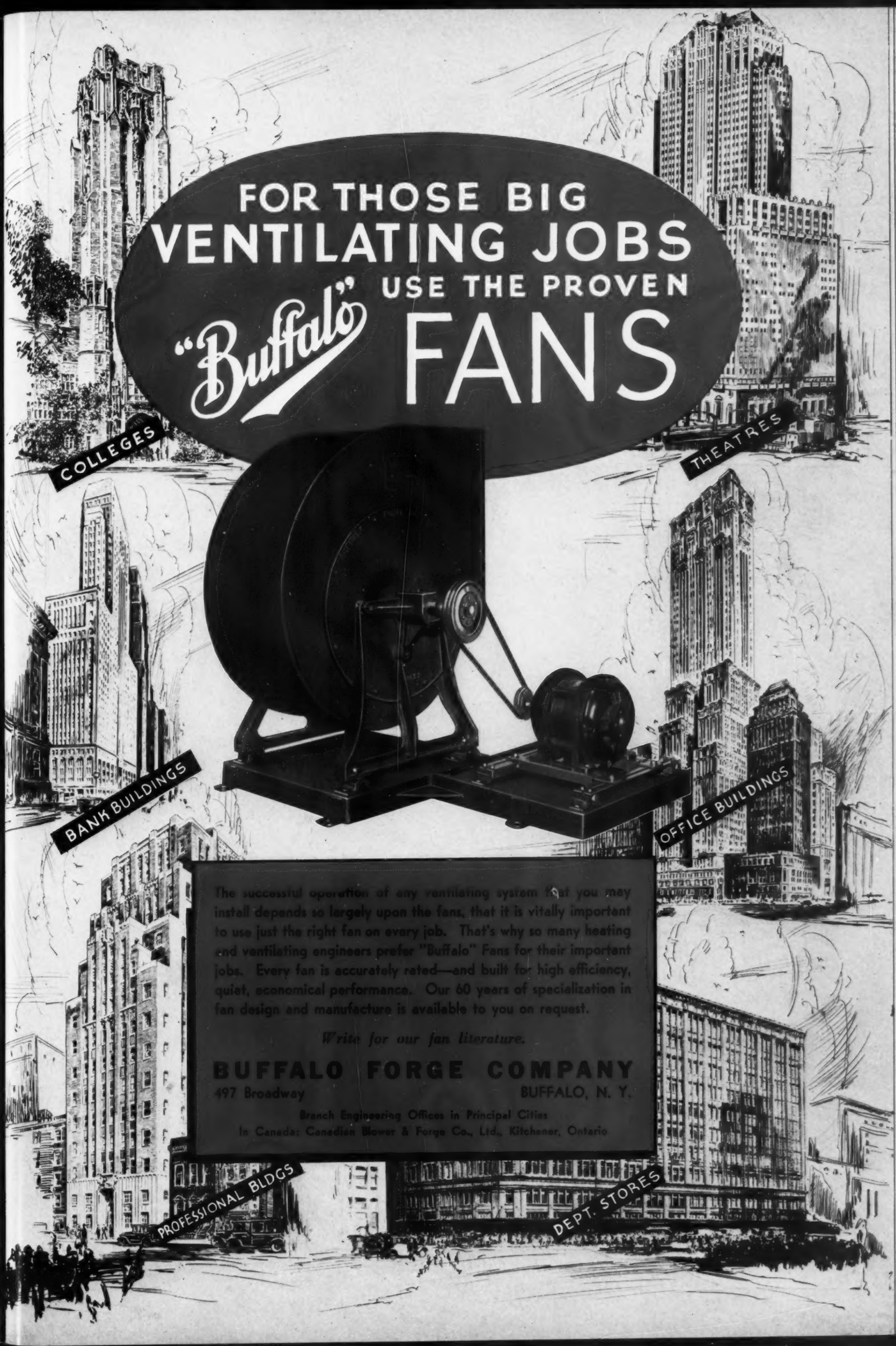
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The successful operation of any ventilating system that you may install depends so largely upon the fans, that it is vitally important to use just the right fan on every job. That's why so many heating and ventilating engineers prefer "Buffalo" Fans for their important jobs. Every fan is accurately rated—and built for high efficiency, quiet, economical performance. Our 60 years of specialization in fan design and manufacture is available to you on request.
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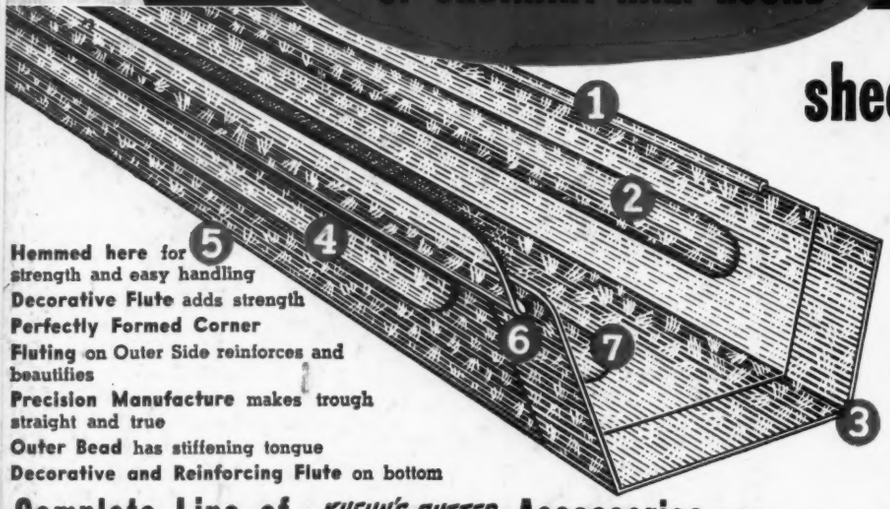
I know we can get better jobs and make more money by concentrating on KUEHN'S GUTTER
Who couldn't, with a beautiful SQUARE gutter—stronger and better than any ever made before—AT THE PRICE OF ORDINARY HALF-ROUND



Hemmed here for strength and easy handling
Decorative Flute adds strength
Perfectly Formed Corner
Fluting on Outer Side reinforces and beautifies
Precision Manufacture makes trough straight and true
Outer Bead has stiffening tongue
Decorative and Reinforcing Flute on bottom

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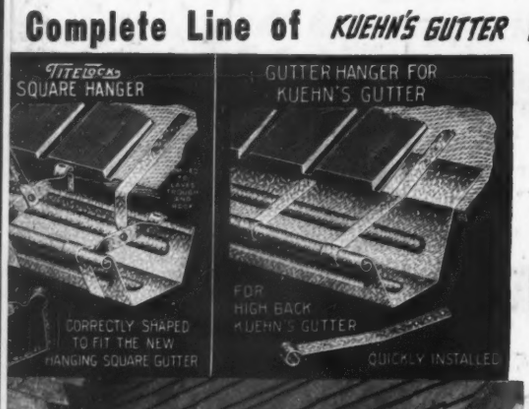
KUEHN'S GUTTE by MILCOR

Complete Line of *KUEHN'S GUTTER* Accessories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GUTTER HANGER FOR KUEHN'S GUTTER
FOR HIGH BACK KUEHN'S GUTTER
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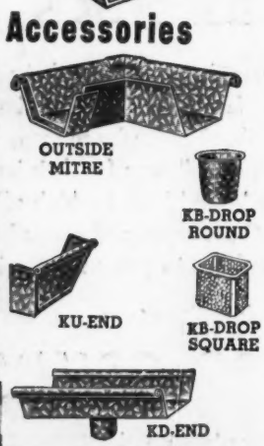

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gives you a job you can be proud of.

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Kuehn's Gutter, with seven exclusive construction feat beats ordinary half-round in every way — and *it costs yo more.* It makes a better job and a better-*looking* job that are proud of — that makes your customer glad to recomm you to others. It gives you something to sell besides p

Precision manufacture makes Kuehn's Gutter straight and Every length is perfectly formed, fits every other length every accessory like a glove, making a quick, easy job of han Labor cost for installation is no more than for ordinary half-ro

Decorative fluting reinforces and strengthens Kuehn's Gutt permits greater expansion and contraction, making stro ice-resisting joints. Kuehn's Gutter will not lose its shap shipping and handling.

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